Contents

Foreword

The International Organization for Standardisation (ISO) is a world-wide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with the ISO, also take part in the work. ISO collaborates with the International Electrotechnical Commission (IEC) on all matters of electreotechnical standardization.

Draft International Standards adopted by technical committees are circulated to the member bodies for voting. Publishing as an International Standard requires approval by at least 75% of the member bodies casting a vote.

International Standard ISA 10303 106 was prepared by Technical Committee ISO/TC 184 *Industrial automation systems and integration,* Subcommittee SC4 *Industrial data and global manufacturing programming languages.*

ISO 10303 currently consisits of the following parts under the general title *Industrial automation systems and integration- Product data representation and exchange:*

- Part 1,	Overview and fundamental principles;
- Part 11,	Description methods: The EXPRESS language reference manual;
- Part 12, manual;	Description methods: The EXPRESS-I language reference
- Part 21, structure;	Implementation methods; Clear text encoding of the exchange
- Part 22, structure;	Implementation methods; Clear text encoding of the exchange
- Part 31, concepts;	Conformance testing methodology and framework: General
- Part 32,	Conformance testing methodology and framework: Requirements on testing laboratories and clients;
- Part 33, cases;	Conformance testing methodology and framework: Abstract test
- Part 41, description and support;	Intergrated generic resources; Fundamentals of product
- Part 42, representation;	Intergrated generic resources: Geometric and topological
- Part 43,	Intergrated generic resources: Representation structures;
- Part 44,	Intergrated generic resources: Product structure configuration:
- Part 45,	Intergrated generic resources: Materials:
- Part 46,	Intergrated generic resources: Visual presentation:
- Part 47,	Intergrated generic resources: Shape variation tolerances:

- Part 49,   Intergrated generic resources: Process structure and properties;

- Part 101,   Intergrated generic resources: Draughting;

- Part 104,   Intergrated generic resources: Finite element analysis;

- Part 105,   Intergrated generic resources: Kinematics;

- Part 106,   Intergrated generic resources: Building Construction Core;

- Part 201,   Application protocol: Explicit draughting;

- Part 202,   Application protocol: Associative draughting;

- Part 203,   Application protocol: Configuration controlled design;

- Part 204,   Application protocol: Mechanical design using boundary representation;

- Part 205,   Application protocol: Mechanical design using surfacerepresentation;

- Part 207,   Application protocol: Sheet metal die planning and design;

- Part 210,   Application protocol: Printed circuit assembly product design data;

- Part 213,   Application protocol: Numerical control process plans for machined parts;

- Part 225,   Application protocol: Building elements using explicit shape representation;

- Part 228,   Application protocol: HVAC;

- Part 230,   Application protocol: Building Structural Frame: Steelwork;

- Part 501,   Application interpreted construct: Edge based wireframe;

- Part 502,   Application interpreted construct: Shell based wireframe;

- Part 503,   Application interpreted construct: Geometrically bounded 2D wireframe;

- Part 504,   Application interpreted construct: Draughting annotation;

- Part 505,   Application interpreted construct: Drawing structure and administration;

- Part 506,   Application interpreted construct:Draughting elements;

- Part 507,   Application interpreted construct: Geometrically bounded surface;

- Part 508,   Application interpreted construct: Non-manifold surface;

- Part 509,   Application interpreted construct: Manifold surface;

- Part 510   Application interpreted construct: Geometrically bounded wireframe;

- Part 511,   Application interpreted construct: Topologically bounded surface;

- Part 512,   Application interpreted construct: Faceted boundary representation;

- Part 513,   Application interpreted construct: Elementary boundary representation;

- Part 514,   Application interpreted construct: Advanced boundary representation;

- Part 515,   Application interpreted construct: Constuctive solid geometry;

- Part 516   Application interpreted construct: Mechanical design context;

- Part 517   Application interpreted construct: Mechanical design geometric presentation;

- Part 518   Application interpreted construct: Mechanical design shaded presentation;

The numbering of the parts of the International Standard reflects its structure:

- Part 11 and 12 specify description methods,

- Parts 21 to 25 the implementation methods,

- Parts 31 to 33 specify the confomance testing methodology and framework,

- Parts 41 to 49 specify the integrated generic resources,

- Parts 101 to 105 specify the integrated application resources,

- Parts 201 to 230 specify the application protocols, and

- Parts 501 to 518 specify the application interpreted constructs.

Should further parts be published, they will follow the same numbering pattern.

Annexes A, B, C, D and E of this document form an integral part of this part of ISO 10303. Annexes F, G, and H are for information only.

Introduction

ISO 10303 is an International Standard for the computer-interpretable representation and exchange of product data. The objective is to provide a neutral mechanism capable of describing product data throughout the lifecycle of a product, independent from any particular system. The nature of this description makes it suitable not only for file exchange but also as a basis for implementing and sharing for product databases and archiving.

The International Standard is organized as a series of parts, each established separately. The parts of ISO 10303 fall into one of the following series: description methods, integrated resources, application integrated contructs, application protocols, abstract test suites, implementation methods, and confomance testing. The series are described in ISO 10303-1. This part of ISO 10303 is a member of the integrated resources series.

This Part of ISO 10303 documents the integrated resources for use by application protocols within building construction and for use in exchanging information between heterogeneous computer applications used by multiple disciplinary participants in the building construction domain.

Although the use of information technology (IT) is increasing rapidly wihtin construction, no product information based standards yet exist for the industry. Applications used in different domains often employ very different systems, and, where data exchange does take place, it is on an ad-hocbasis. This part of ISO 10303 addresses the growing need

for an integrated approach to the use of IT within building construction.

Data of interest to multiple disciplinary participants in building construction is represented in a model which captures a project based view. The model describes project data developing through characteristic lifecycle stages as products (the physical results of construction), resources (facilities provided to assist construction), processes (activities undertaken in construction) and controls (constraints governing construction).

The integrated resource defines the context, scope and information requirements for the representation and exchange of information relating to building construction between disciplines.

Clause 1 defines the scope of the integrated resource and summarises the functionality and data covered by the IR. An application activity model that is the basis for the definition of the scope is provided in Annex F. The information requirements of the application are specified in clause 4 using terminology apprpriate to the application. A graphical representation of the information requirements, reffered to as the application reference nmodel is given in Annex G.

Resource constructs are interpreted to meet the information requirements. This interpretation produces the application interpreted model (AIM). This interpretation shows the correspondence between the information requirements and the AIM. The short listing of the AIM specifies the interface to the integrated resources. Note that the defenitions and EXPRESS provided in the integrated resources for constructs used in the AIM may include select list items and subtypes which are not imported into the AIM without annotation. A graphical representation of the AIM in given in Annex H. Additional requirements for specific implementation methods are given in Annex D.

Industrial automation systems and integration - Product data representation and exchange - Building Construction Core Model

1   Scope

This part of ISO 10303 specifies the integrated resources necessary for:-

1. The provision of a framework to give a basis for the production of consistent Application Reference Models (ARMs) within the domain of building construction.
2. The provision of a framework to give a basis for the interoperability of Application Protocols within the domain of building construction.
3. The provision of elements of ARMs which describe information of common interest throughout the domain of building construction and which are independant of the context in which they are used.
4. The exchange of building construction information of common interest between the various disciplines

The domain of building construction comprises everything which is constructed or results from construction operations and which has as its primary purpose the provision of shelter for its occupants or contents and is usually enclosed and is designed to stand permanently in one place.

Within this definition, building construction includes:-

- Products i.e. the tangible items which are used in and result from building construction processes.
- Processes i.e. the logistics and activities which are required in order to achieve the resulting products.
- Resources i.e human, plant and constructed items (which are normally temporary but which may be embodied in the final result) employed and deployed to enable the processes to take place
- Controls i.e constraints which may be applied to the products, processes and resources during construction.

Within this definition, disciplines means all those separate and recognised trades and professions whose skills are normally utilised as resources within the processes of building construction.

This part of ISO 10303 specifies the integrated resources as defined above for all stages of the life cycle for building construction including:-

- Proposal i.e determining the requirements of the proposed building construction, the feasibility of its execution in one or more designated places and a preliminary indication of its extent.
- Design i.e. the detailed specification of the means of achieving the proposal at the single selected place.
- Planning i.e. determining the procedures and costs associated with interpreting the design as a completed product.
- Realisation i.e. interpreting the design as a completed product according to the planning criteria.
- Management i.e. operating the product in the manner proposed and maintaining it as closely as possible in the state in which it was realised.

1.1   Provision

The scope of this part of ISO 10303 specifically requires the provision of integrated reources for the satisfaction of four requirements. The following expands on this provision.

1.1.1   Consistent Application Reference Models (ARMs)

Building construction is typically identified as a 'fragmented' industry comprising a large number of disciplines many of which will participate as actors in a single building construction project. The diverse range and nature of these disciplines will lead to the development of a large number of ARMs to meet the complete requirements of the industry. For instance, within the structural engineering discipline, it is possible to identify separate ARM requirements for steel frameworks, reinforced concrete structures, composite structures, brick and masonry structures. Similar arguments apply equally to other disciplines. The fact that there is usually separation between designer and constructor within the disciplines may also give rise to the need for different ARMs appropriate to such separation. Without a consistent basis for model development, it is probable that models produced in isolation will vary arbitrarily and will be difficult to reconcile. Independant models developed with the same basis however will tend to be consistent. By providing such a basis, this part of ISO 10303 provides a framework for model development which has the added advantage of easing the interpretation of models according to the generic resources of ISO 10303.

1.1.2   Interoperability of Application Protocols.

As a result of the consistent framework outlined in 1.1.1 above, this part of ISO 10303 also supports the interoperability of Application Protocols at the data level which would not be the case should the ARMs supporting the Application Protocols be developed without a consistent basis. The provision of data models of context independant information outlined in 1.1.3 below further supports the provision of interoperability.

1.1.3   Context Independant Information

In the sense of this part of ISO 10303, context independant information means independant within the domain of building construction but not necessarily outside the domain of building construction (for which purpose reference should be made to the generic resources of ISO 10303). Whilst a discipline is characterised by the use of particular professional or trade skills, there are many matters which are of importance to all or several disciplines and which therefore may be the subject of data models which are independant of the discipline context. It is envisaged that such context independant models will be directly included within the ARM of an Application Protocol as part of the information requirement defined by its scope and may have further context dependant information added. However, the provision of such context independant models supports the concept of a consistent basis for modelling and interoperability.

Context independant information includes for references within an ARM to external data models which support other de jure and de facto normative references including those concerned with Libraries (ISO 13584 et al) and Classification (ISO TC59).

1.1.4   Information of Common Interest

Information of common interest is that context independant information which may need to be exchanged or shared on a common basis basis between all or several of the discipline actors in a building construction project. It will not be all of the context independant information, some of which may be used in a context dependant manner. Information of common interest supports the provision of interoperability by providing the means to exchange or share information between disciplines, such information then being able to be utilised by the Application Protocol. This provision is intended to be implementable in a manner equivalent to an Application Protocol and it is envisaged that Application Protocols which are interoperable with this part of ISO 10303 will include a conformance class that enables use of this part of ISO 10303.

1.2   ARM Level Integration

ISO 10303 provides for the interpretation of an Application Protocol according to its generic resources and for this purpose, each Application Protocol is required to provide an Application Interpreted Model (AIM). This part of ISO 10303 is intended to ease interpretation of Application Protocols by allowing for integration of a context dependant Application Protocol with a context independant integrated domain resource whose provisions it has already used as a basis for consistency. Such integration is deemed to be ARM level integration and, through the interpretation of this part of ISO 10303, is intended to accelerate interpretation of the Application Protocol.

No statement made within this part of ISO 10303 should be interpreted as affecting or changing the requirements of any other part of ISO 10303 particularly insofar as such other part states the architecture, methodology or methods used in the whole of ISO 10303.

1.3   Out of Scope

The following are outside the scope of this part of ISO 10303:-

- Everything which is constructed or results from construction operations <u>which does not have</u> as its primary purpose the provision of shelter for its occupants or contents.
- Everything which is constructed or results from construction operations which is <u>designed to move between places</u>.
- The exchange of information which is dependant upon an application context.
- The exchange of information concerning the <u>explicit</u> shape representation of building elements other than by reference to ISO 10303 part 225.
- The exchange or translation of classification data from one classification system to another.

2   Normative References

The following standards contain provisions which, through reference in this text, constitute provision of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 10303-1 *Industrial automation systems and integration - Product data   representation and exchange - Part 1: Overview and fundamental principles.*

ISO 10303-11   *Industrial automation systems and integration - Product data representation and exchange - Part 11: Description methods: The EXPRESS language reference manual.*

ISO 10303-21   *Industrial automation systems and integration - Product data representation and exchange - Part 21: Implementation methods: Clear text encoding of the exchange structure.*

ISO 10303-41   *Industrial automation systems and integration - Product data representation and exchange - Part 41: Integrated generic resources: Fundamentals of product description and support.*

ISO 10303-42   *Industrial automation systems and integration - Product data representation and exchange - Part 42: Integrated generic resources: Geometric and topological representation.*

ISO 10303-43   *Industrial automation systems and integration - Product data representation and exchange - Part 43: Integrated generic resources: Representation structures.*

ISO 10303-44   *Industrial automation systems and integration - Product data representation and exchange - Part 44: Integrated generic resources: Product structure configuration.*

3   Definitions and abbreviations

3.1   Terms defined in ISO 10303-1

This part of ISO 10303 makes use of the following terms defined in ISO 10303-1:

- application;

- application activity model (AAM);

- application interpreted model (AIM);

- application protocol (AP);

- application reference model (ARM);

- conformance testing;

- implementation method;

- integrated resource;

- product;

- product data;

- unit of functionality (UoF).

3.2   Terms defined in ISO 10303-31

This part of ISO 10303 makes use of the following terms defined in ISO 10303-31;

 - Abstract test suite (ATS);

- Conformance class;

- Protocol information and conformance statement (PICS).

3.3   Other definitions

For the purpose of ISO 10303, the following definitions will apply.

3.4   Abbreviations

For the purpose of ISO 10303, the following abbreviations will apply:

AEC	Architecture, Engineering, and Construction
BC	Building Construction
HVAC	Heating, Ventilation, and Air Conditioning
ID	IDentification

4   Information Requirements

This clause specifies categories of information relating to building construction which buildiing construction applications supported by this Integrated Resource will include.

The information requirements are specified as a set of application objects and application assertions. These assertions pertain to individual application objects and to relationships between application objects and are defined in the terminology of the industry domain.

NOTE 1: A graphical representation of the information requirements is provided in annex G.

4.1   Units of Functionality

This subclause specifies the units of functionality for the Building Construction Core Model. This part of ISO 10303 specifies the following units of functionality:

- construction_cost_information UoF

- construction_scheduling_information UoF

- distribution_function_information UoF

- furnishing_function_information UoF

- separation_function_information UoF

- project_definition_and_location_information UoF

- space_function_information UoF

- structural_function_information UoF

The units of functionality and a description of the functions that each UoF supports are given below. The application objects included in the UoFs are defined in clause 4.2.

4.1.1   construction_cost_information UoF

4.1.2   construction_scheduling_information UoF

4.1.3   distribution_function_information UoF

4.1.4   furnishing_function_information UoF

4.1.5   separation_function_information UoF

4.1.6   project_definition_and_location_information UoF

4.1.7   space_function_information UoF

4.1.8   structural_function_information UoF

4.2　Core Objects

This subclause specifies the core objects for building construction using the Building Construction Core Model. Each core object is an atomic element that embodies a unique core concept and contains attributes specifying the data elements of the object. The core objects and their definitions are given below.

4.2.1　AcousticInsulationFactor
An InsulationFactor which specifies sound attenuation. (BCCM)

4.2.2　AcquiredControlObject
Item acquired for use as a control. (BCCM)

4.2.3　AcquiredResourceObject
Item acquired from a manufacturer or supplier for use as a resource. (BCCM)

4.2.4　Acquisition Order
An instruction to a BC_Actor to provide products or services. (BCCM)

4.2.5　ActualCurrency
The money of a country or community. (Ox)

Attribute definitions:
classified_by:　Available designations for the country or community issuing a currency and the currency designation. (BCCM)

4.2.6　BC_Actor
A functional participant in building construction. (BCCM)

Attribute definitions:
actor_name:　The name by which a BC_Actor is normally known or the trading name used for purposes of identification. (BCCM)
postal_address:　The postal or mail address of a BC_Actor. (BCCM)
office_address:　The office address of a BC_Actor
postal_code:　The postal or zip code of a BC_Actor. (BCCM)
telephone_number:　　The telephone number of a BC_Actor. (BCCM)
fax_number:　The facsimile number of a BC_Actor. (BCCM)
email_address:　The electronic mail address of a BC_Actor. (BCCM)

4.2.7　BC_Availability
Ability of an item to be obtained or used when needed. (172 7001 - availability)

Attribute definitions:
available_in:　Period within which goods or services can be obtained. (BCCM)

4.2.8　BC_Budget
An estimate or proposal of cost. (Ox)

4.2.9　BC_BuildingObject
A product resulting from the process of building construction that has the provision of shelter for its occupants or contents as one of its main purposes and is usually enclosed and designed to stand in one place. (100 1103 - building)

4.2.10 BC_ClassificationFunction

The arrangement of objects into a class or category according to their possession of common attributes or characteristics. (Ox)

Attribute definitions:
priority: The position at which is located the particular item in a list of BC_ClassificationFunctions which is given precedence. (BCCM)

4.2.11 BC_ConstructionActivity

An assembly of construction tasks which, together, can be described as a singular activity. (BCCM)

Attribute definitions:
activity_number: A designation for the particular activity. (BCCM)

4.2.12 BC_ConstructionPlan

Document that details the stages of work, main tasks to be carried out and actors carrying out work in building construction. (100 5205 - plan of work)

4.2.13 BC_ConstructionProcess

A process whose purpose is the incorporation of products or resources into the building construction or the assembly of products or resources into a resulting product or resourcefor later incorporation or use. (BCCM)

4.2.14 BC_ConstructionProcessObject

A process or taskwhose purpose is the incorporation of products or resources into the building construction or the assembly of products or resources into a resulting product or resource for later incorporation or use. (BCCM)

4.2.15 BC_ConstructionTask

A set of processes which can be combined into a single identifiable task to be carried out independantly of any other tasks. (BCCM)

Attribute definitions:
task_number: A designation for the particular activity. (BCCM)
task_description: A text description of the task to be undertaken as it appears in a ConstructionPlan. (BCCM)

4.2.16 BC_ControlCharacteristic

A characteristic or property of a BC_ControlObject which may take on different values during the life cycle. (BCCM)

4.2.17 BC_ControlObject

A specification, regulation, constraint or other requirement applied to a product or process whose requirements and provisions must be fulfilled. (BCCM)

4.2.18 BC_ControlPresentation

The method by which controls are presented, e.g. drawings and documents. (BCCM)

Attribute definitions:
presentation_media: The medium in, on or by which information is presented. (BCCM)
presentation_version: The version of the BC_ControlPresentation used. (BCCM)
presentation_title: The title by which the BC_ControlPresentation is normally known. (BCCM)
presentation_status: The current status of the BC_ControlPresentation. (BCCM)

4.2.19 BC_Cost

Amount to be paid for a product, process or resource. (156 1010 - cost)

Attribute definitions:

net_cost: The amount of Cost after the application.of a DiscountRate and any other cost factors. (BCCM)

actual_currency: The money of a country or community. (Ox)

gross_cost: The amount of Cost before the application.of a DiscountRate or any other cost factors. (BCCM)

4.2.20 BC_CostSchedule

Document which provides a schedule of costs. (BCCM)

Attribute definitions:

cost_schedule_title: Title of a CostSchedule. (BCCM)

4.2.21 BC_CostScheduleElement

Goods or services or the execution of works of a described elemental nature in given conditions. (BCCM)

Attribute definitions:

element_quantity: The quantity of goods or services or the execution of works of a described elemental nature. (BCCM)

element_description: Text description of a CostScheduleElement.(BCCM)

4.2.22 BC_CostScheduleObject

An object whose cost may be proposed in a schedule. (BCCM)

4.2.23 BC_CostScheduleSection

A defined section of the whole CostSchedule. (BCCM)

Attribute definitions:

section_title: Title of a CostScheduleSection section. (BCCM)

section_number: A designation for the particular section. (BCCM)

4.2.24 BC_DesignActivity

An assembly of design tasks which, together, can be described as a singular activity. (BCCM)

4.2.25 BC_DesignProcess

A process whose purpose is the design of products or resources. (BCCM)

4.2.26 BC_DesignProcessObject

A process or task whose purpose is the design of products or resources. (BCCM)

4.2.27 BC_DesignTask

A set of processes which can be combined into a single identifiable task to be carried out independantly of any other tasks. (BCCM)

4.2.28 BC_DetectionSignalDistributionObject

Organized combination of connected parts within a building designed to distribute the flow of a detection signal to its points of use. (100 3101 - structure) (BCCM)

4.2.29 BC_DistributionObject

Organized combination of connected parts within a building designed to distribute the flow of a medium to its points of use or consumption. (100 3101 - structure) (BCCM)

4.2.30 BC_ElectricityDistributionAssembly

An assembly of parts which has the purpose of distribution of electricity. (BCCM)

4.2.31 BC_ElectricityDistributionObject

Organized combination of connected parts within a building designed to distribute the flow of electricity to its points of use or consumption. (100 3101 - structure) (BCCM)

4.2.32 BC_ElectricityDistributionPart

A part whose purpose is the distribution of electricity. (BCCM)

4.2.33 BC_FunctionObject

A description of function or role played by parts in systems. (BCCM)

4.2.34 BC_FurnishingElement

An element whose purpose is to facilitate building use. (BCCM)

4.2.35 BC_FurnishingGroup

A group of elements with the purpose of facilitating building use. (BCCM)

4.2.36 BC_FurnishingObject

Combination of parts within a building designed to facilitate its use. (BCCM)

4.2.37 BC_GasDistributionAssembly

An assembly of parts which has the purpose of distribution of gas. (BCCM)

4.2.38 BC_GasDistributionObject

Organized combination of connected parts within a building designed to distribute the flow of gas to its points of use or consumption. (100 3101 - structure) (BCCM)

4.2.39 BC_GasDistributionPart

A part whose purpose is the distribution of gas. (BCCM)

4.2.40 BC_HVAC_Assembly

An assembly of parts which has the purpose of distribution of air for heating and ventilation. (BCCM)

4.2.41 BC_HVAC_Object

Organized combination of connected parts within a building designed to distribute the flow of air for heating and ventilation to its points of use or consumption. (100 3101 - structure) (BCCM)

4.2.42 BC_HVAC_Part

A part whose purpose is the distribution of air for heating and ventilation. (BCCM)

4.2.43 BC_Identification

An identity or designation by which an object may be recognized for a particular purpose. (BCCM)

unique_id: An identity or designation by which an object is recognized for any purpose and which remains invariant during exchange or sharing such as a database handle. (BCCM)
physical_id: A unique identity or designation by which an object may be recognized for a particular purpose and which is associated with the physical item rather than the place at which it is located such as a serial number. (BCCM)

4.2.44 BC_Library

A collection of objects which is created to assist in the selection of a product, erudition, regulation etc. applicable for a purpose. (AP221)

Attribute definitions:
version_number: The version number of the Library (BCCM)
protocol: Rules governing the means of interfacing with a library. [BCCM]
library_name: The title of a Library or the name by which it is normally known. (BCCM)

4.2.45 BC_LibraryObject

Definition of some or all of the properties of an entity through a reference to a LibraryElement or the address of a LibraryElement. [AP221]

Attribute definitions:
library_address: A pointer to a location at which the entity of interest is presented. (Ox)

4.2.46 BC_LogisticProcessObject

A process whose purpose is the procurement and transportation of products required for incorporation into the building construction. (BCCM)

4.2.47 BC_Material

Substance that can be used to form products and resources. (100 4101 - material)

Attribute definitions:
material_name: The name by which a material is normally known. (BCCM)
material_reference: A reference to a material, usually by a standard designation published in a Standard, Code of Practice or similar document. (BCCM)

4.2.48 BC_Performance

Behaviour related to use. (100 7001 - performance).

Attribute definitions:
performance_rating: A rating or measure of behaviour related to use. (100 7001 - performance).

4.2.49 BC_PipingAssembly

An assembly of parts which has the purpose of distribution of a fluid. (BCCM)

4.2.50 BC_PipingFeature

A feature applied to the surface of a BC_PipingObject. (BCCM)

4.2.51 BC_PipingObject

Organized combination of connected parts within a building designed to distribute a fluid to its points of use or consumption. (100 3101 - structure) (BCCM)

4.2.52 BC_PipingPart

A part whose purpose is the distribution of a fluid. (BCCM)

4.2.53 BC_Position

Designation of location. (BCCM)

Attribute definitions:
dependent_location: A location which is identified by one or more attributes of an instance of another entity. (BCCM)
grid_reference: A location determined according to a rectangular or polar co-ordinate reference system. (151 3007 - grid)

4.2.54 BC_ProcessCharacteristic

A characteristic or property of a BC_ProcessObject which may take on different values during the life cycle. (BCCM)

4.2.55 BC_ProcessObject

An action or sequence of actions taking place in building construction with the intent of acquiring or constructing a BC_ProductObject. (Ox)

4.2.56 BC_ProcurementObject

The process of arranging the purchase of products and services. (BCCM)

4.2.57 BC_ProductCharacteristic

A characteristic or property of a BC_ProductObject which may take on different values during the life cycle. (BCCM)

4.2.58 BC_ProductObject

Item manufactured or supplied for incorporation into the building construction. (100 4103 - product)

4.2.59 BC_Project

A proposal, plan or scheme to undertake building construction. (Ox)

Attribute definitions:
project_name: The name by which a project is known. (BCCM)

4.2.60 BC_ProjectObject

Everything that is constructed or results from building construction processes. (100 1101 - construction works)

Attribute definitions:
bc_name A general name by which anything in a building construction may be known. (BCCM)
version_number: A unique reference used to instantiate a particular form or variant. (Ox)

4.2.61 BC_Quality

Totality of properties that bear on ability to satisfy needs. (171 1005 - quality)

Attribute definitions:
quality_document_name: The name by which a document describing quality is normally known. (BCCM)

4.2.62 BC_Remittance

Payment made for the provision of products and services. (BCCM)

4.2.63 BC_ResourceCharacteristic

A characteristic or property of a BC_ResourceObject which may take on different values during the life cycle. (BCCM)

4.2.64 BC_ResourceObject

Item provided to assist in the process of building construction. (Ox)

4.2.65 BC_ResultingControlObject

Item resulting from a process which acts to constrain a subsequent process. (BCCM)

4.2.66 BC_SeparationAssembly

An assembly of parts whose purpose is separation. (BCCM)

4.2.67 BC_SeparationElement

An element whose purpose is the separation of spaces. (BCCM)

4.2.68 BC_SeparationFeature

A feature applied to the surface of a BC_SeparationObject. (BCCM)

4.2.69 BC_SeparationObject
Organized combination of connected parts within a building designed to provide some measure of separation. (100 3101 - structure)

4.2.70 BC_SeparationPart
A part whose purpose is separation. (BCCM)

4.2.71 BC_SequenceRelation
A sequential relationship between BC_ProcessObjects. (BCCM)

4.2.72 BC_Shape
Form or profile of an object or a geometrical figure. (172 2007)

4.2.73 BC_ShapePresentation
Graphical information presented for the purpose of control. (BCCM)

4.2.74 BC_ShapeView
A shape presentation given as a particular view. (BCCM)

4.2.75 BC_SignalDistributionObject
Organized combination of connected parts within a building designed to distribute the flow of a signal to its points of use. (100 3101 - structure) (BCCM)

4.2.76 BC_SiteObject
A place where construction processes are carried out. (100 1104 - site)

Attribute definitions:
postal_address: The postal or mail address of a BC_SiteObject. (BCCM)
city: The urban placename in which the site is located. The term city may be interpreted as hamlet, village, town, city or metropolis. (BCCM)
region: The larger administrative area in which the site is located. The term region may be interpreted as county, state, department. (BCCM)
country: The country in which the site is located. (BCCM)

4.2.77 BC_SpaceObject
Area or volume within a building which is bounded actually or theoretically. (100 2101 - space)

Attribute definitions:
nett_area: The area of a space taking into account deduction for any space which is not useful. (BCCM)
gross_area: The area of a space measured around the profile of the BoundaryObjects without deduction. (BCCM)

4.2.78 BC_Specification
Description of characteristics of a product, process or resource in terms that include design and constructional details with sizes and material composition. (156 3010 - descriptive specification)

Attribute definitions:
specification_title: Title by which a Specification is normally known. (BCCM)

4.2.79 BC_SpecificationClause

A statement of requirements for the materials and workmanship of building conmstruction. (156 3008 - specification preambles)

Attribute definitions:
specification_clause_title: Title by which a SpecificationClause is normally known. (BCCM)
clause_number: Number or reference by which a SpecificationClause is identified. (BCCM)
clause_text: Text describing the required characteristics of a product, process or resource. (BCCM)

4.2.80 BC_SpecificationObject

Description of characteristics of a product, process or resource. (156 3010)

4.2.81 BC_SpecificationSection

An individual part of a Specification. (BCCM)

Attribute definitions:
section_number: Number or reference by which a SpecificationSection is identified. (BCCM)
section_heading: Title by which a SpecificationSection is normally known. (BCCM)

4.2.82 BC_Status

The condition or state applied to an object. (Ox)

Attribute definitions:
authorization_date: The date at which a change in status is authorized. (BCCM)
status_type: Type of status. (BCCM)

4.2.83 BC_StructuralAssembly

A composition of StructuralElements. (BCCM)

4.2.84 BC_StructuralElement

Part of a structure intended to resist forces. (100 3102 - structural member)

4.2.85 BC_StructuralFeature

A feature applied to the surface of a BC_StructuralObject. (BCCM)

4.2.86 BC_StructuralObject

Organized combination of connected parts within a building designed to provide some measure of rigidity. (100 3101 - structure)

4.2.87 BC_StructuralPart

A part whose purpose is structural. (BCCM)

4.2.88 BC_TV_SignalDistributionObject

Organized combination of connected parts within a building designed to distribute the flow of a TV signal to its points of use. (100 3101 - structure) (BCCM)

4.2.89 BC_TabularSchedule

Documentation in the form of tables or detailed lists. (156 1005 - schedule)

Attribute definitions:
schedule_title: The title of a TabularSchedule or the name by which it is normally known. (BCCM)

4.2.90 BC_TabularScheduleField

A column within a Schedule. (BCCM)

Attribute definitions:

field_title: The title of a TabularScheduleField. (BCCM)
field_type: The simple data type of values entered within a tabular schedule field as either real, integer or string. (BCCM)
field_values: The value of an item within a tabular schedule field of the declared schedule field type. (BCCM)

4.2.91 BC_TapWaterDistributionObject

Organized combination of connected parts within a building designed to distribute the flow of tap water to its points of consumption or use. (100 3101 - structure) (BCCM)

4.2.92 BC_Tender

An offer, submitted in writing or by agreed electronic media and format, to execute at a stated price or rate an order for the supply of goods or services or the execution of works in given conditions. (156 4001 - tender)

Attribute definitions:

method: The price variation method of a tenderm, either fixed or variable price being allowed. (BCCM)
conditions: Conditions applied to submission or acceptance of the tender. (BCCM)
price_fluctuation_date: Base date specified in an accepted variable price tender from which price fluctuations may be calculated. (BCCM)

4.2.93 BC_TimeFrame

A characteristic of a process which establishes the time during which the process muct be carried out. (BCCM)

4.2.94 BC_TimeSlot

A defined period of time with a starting date and and ending date.

Attribute definitions:

starting_date: The date on which a time slot starts. (BCCM)
ending_date: The date on which a time slot ends. (BCCM)

4.2.95 BC_TransportationObject

The process of arranging the movement of products and resources. (BCCM)

4.2.96 BC_WasteWaterDistributionObject

Organized combination of connected parts within a building designed to distribute the flow of waste water from its points of use. (100 3101 - structure) (BCCM)

4.2.97 BC_WaterDistributionObject

Organized combination of connected parts within a building designed to distribute the flow of water to or from its points of consumption or use. (100 3101 - structure) (BCCM)

4.2.98 BC_WiringAssembly

An assembly of wiring parts. (BCCM)

4.2.99 BC_WiringObject

Organized combination of connected wiring parts and assembles within a building. (100 3101 - structure) (BCCM)

4.2.100 BC_WiringPart

A part used in wiring. (BCCM)

4.2.101 Beam

Structural member designed to carry loads between or beyond points of support, usually narrow in relation to its length and horizontal or nearly so. (100 3108 - beam)

4.2.102 BillOfMaterials

Document that comprises both a descriptive list of quantities of works and descriptions of the materials, workmanship and other matters. (100 5207 - bill of quantities)

4.2.103 Block

An assembly of building elements where each element fulfils the same purpose. (BCCM)

4.2.104 Boiler

Appliance in which the combustion of fuel occurs. (BCCM)

4.2.105 Brace

StructuralElement used for bracing. (100 3113 - wind brace)

4.2.106 Brick

A type of material. (BCCM)

4.2.107 Building

A single product resulting from the process of building construction that has the provision of shelter for its occupants or contents as one of its main purposes and is usually enclosed and designed to stand in one place. (100 1103 - building)

4.2.108 BuildingComplex

An aggregation of products resulting from the process of building construction that has the provision of shelter for its occupants or contents as one of its main purposes and is usually enclosed and designed to stand in one place. (100 1103 - building)

4.2.109 BuildingElement

A part of a product resulting from the process of building construction that has the provision of shelter for its occupants or contents as one of its main purposes and is usually enclosed and designed to stand in one place. (100 1103 - building)

4.2.110 BuildingElementAssembly

An assembly of building elements. (BCCM)

4.2.111 BusinessUnit

An assembly of office spaces in which a particular business function is undertaken. (BCCM)

4.2.112 Cable

Assembly of wires, usually parallel. of considerable length formed into a compact circular section. (210 5036 - cable)

4.2.113 Cellar

A basement space normally used for purposes other than habitation. (100 2208 - cellar)

4.2.114 ChangeOrder

An instruction to modify one or many aspects of a control, product or resource by virtue of a requirement to change its characteristics . (AP225)

4.2.115 Channel

Continuous recess formed in a BoundaryObject. (100 3531 - chase)

4.2.116 CharacteristicFunction

Classification defined according to characteristics of the object and according to a given classification schema. (ISO TC59)

Attribute definitions:

publisher: The name by which the publisher of the classification system or the classification system itself is normally known. (ISO TC59)

element_table: The table or grouping within the classification system which is appropriate to a particular characteristic function. (ISO TC59)

notation: The identity given to the address within the table or grouping of a particular classification system. (ISO TC59)

4.2.117 CirculationSpace

A space provided for the movement of persons, goods or vehicles. (100 2401 - circulation space)

4.2.118 ClientBrief

Statement of the client's requirements for a project. (156 1004 - brief)

4.2.119 ClosingObject

An object inserted into a BC_SeparationFeature left within a BC_SeparationObject.. (BCCM)

4.2.120 CodeOfPractice

A system of rules governing the manner in which some process is to be carried out. (Ox)

4.2.121 Column

StructuralElement of slender form, usually vertical or nearly so, that transmits to its base the forces, primarily in compression, that are applied to it. (100 3130 - column)

4.2.122 Composite

A type of material made up of different materials that acts monolithically. (210 5025 - composite construction)

4.2.123 ComputerSoftware

Executable computer programs and data provided to assist in the process of building construction. (Ox)

4.2.124 Connector

A means of describing a connective relationship. (BCCM)

4.2.125 ConstructionAid

Equipment, plant and materials provided to assist in the process of building construction. (Ox)

4.2.126 ConstructionPit

A type of SiteElementAssembly. (BCCM)

4.2.127 ContractAgreement

Legally enforceable agreement to supply goods, execute work or provide services. (156 5001 - contract)

Attribute definitions:

contract_type: The form of ContractAgreement. (156 5001 - contract

jurisdiction: The place whose legal system governs the execution of a ContractAgreement. (BCCM)

4.2.128 ContractPeriod

Period stipulated in a contract for the execution of the work. (156 5008 - contract period)

4.2.129 Core

A type of BC_StructuralAssembly. (BCCM)

4.2.130 Corridor

Narrow enclosed circulation space that gives access to rooms or other spaces. (100 2402 - corridor)

4.2.131 CurrencyClassification

A classification of currency types according to the geographical entity in which they are used. (BCCM)

4.2.132 Date

A designation of a particular day. (BCCM)

Attribute definitions:

day: Position of the day in a numerical sequence for a given month. (BCCM)

month: Position of the month in a numerical sequence for a given year or the name given to that position. (BCCM)

year: A numerical identification according to a defined calendar basis. (BCCM)

4.2.133 DecorationObject

A type of BC_FurnishingElement used for decoration or adornment. (BCCM)

4.2.134 Discount

A percentage rate or set of rates which is applied to a cost to provide a deduction or addition to a gross cost so as to give a net cost. (Ox)

Attribute definitions:

discount_rate: A percentage rate of discount. (Ox)

discount_purpose: Reason for the application of a DiscountRate. (BCCM)

4.2.135 DistributionConnection

A means of describing the connection of BC_DistributionSystemObjects. (BCCM)

Attribute definitions:

distribution_connection_type: A type of DistributionConnection. (BCCM)

4.2.136 Door

Construction for closing an opening or hole intended primarily for access and with hinged, pivoted or sliding operation. (100 3302 - door)

4.2.137 DwellingSpaceObject

A space provided for habitation. (100 2401 - circulation space)

4.2.138 ElementaryOfficeSpace

A single unit of office space within an OfficeSpaceAssembly. (BCCM)

4.2.139 Envelope

Vertical construction that bounds or envelops a building. (100 3104 - wall)

4.2.140 ExplicitShape

The mathematic or geometry data that describes or defines the spatial and/or volumetric boundaries of an object. (AP225)

4.2.141 Facade

A separation consisting of an individual part of an Envelope. (BCCM)

4.2.142 FireEscapeRoute

A GeneralSpaceAssembly designated as a route by which egress from a building may be effected in the event of outbreak of fire. (BCCM)

4.2.143 FireInsulationFactor

An InsulationFactor which specifies resistance to fire. (BCCM)

4.2.144 FittingObject

A type of BC_FurnishingObject. (BCCM)

4.2.145 Floor

The lowest boundary of any space in a building. (100 3206 - floor)

4.2.146 FormWorkObject

Structure, either temporary or permanent, provided to contain fresh concrete and support it in the required shape and size until it has hardened. (100 5303 - formwork)

4.2.147 Foundation

Construction to transmit forces to the supporting ground. (100 3105 - foundation)

4.2.148 Frame

A structure composed primarily of linear StructuralElements. (100 3141 - frame)

4.2.149 FurnitureObject

Example of BC_FurnishingObject. (BCCM)

4.2.150 GeneralElementarySpace

An individual GeneralSpaceObject. (BCCM)

4.2.151 GeneralSpaceAssembly

An assembly of GeneralElementarySpaces. (BCCM)

4.2.152 GeneralSpaceObject

A type of space used for general purposes

4.2.153 GIS_Position

A position measured by latitude, longitude and elevation. (BCCM)

Attribute definitions:
elevation: Height measured above sea level. (BCCM)
latitude: Angular position on the earths surface measured north or south of the equator.
longitude: Angular position on the earths surface measured east of the zero meridian.

4.2.154 GypsumPlate

A type of BC_SeparationPart. (BCCM)

4.2.155 Hall

A type of space. (BCCM)

4.2.156 HeatExchanger

An appliance in which heat is transferred from a primary medium to a secondary medium. (BCCM)

4.2.157 Hole

Void forming a feature in a BC_SeparationObject. (100 3301 - opening)

4.2.158 HospitalSpaceObject

A type of space within a hospital. (BCCM)

4.2.159 HumanResource

Human effort provided to assist in the process of building construction. (Ox)

4.2.160 InnerWall

Vertical construction that bounds or subdivides a space internally. (100 3104 - wall)

4.2.161 InsulationFactor

A factor specifying the resistance of a material or product to an applied source of energy. (BCCM)

4.2.162 InsulationPipe

A type of BC_ElectricityDistributionPart

4.2.163 ItemCost

Cost of a product, process or resource as a single item. (156 1010 - cost)

4.2.164 LPG_Tank

A container in which liquified petroleum gas is stored. (BCCM)

4.2.165 Level

A part of a building or site that consists of one or many areas accessible through primarily horizontal access paths. (AP225)

4.2.166 LiftShaft

Space in which the lift car and the counterweight (if any) move. This space is materially enclosed by the bottom of the pit, the approximately vertical walls and the ceiling. (322 1201 - lift well)

4.2.167 LightSwitch

Mechanically operated contactor used for connecting or disconnecting electricity distribution to lamps. (310 5604 - switch)

4.2.168 LoadbearingWall

Vertical construction that bounds or subdivides a space and fulfils a loadbearing function. (100 3104 - wall)

4.2.169 Logical_id

An identity or designation by which an object may be recognized for a general purpose and which is associated with a an item at a given location rather than with the physical item such as an asset number or a schedule reference. (BCCM)

Attribute definitions:
logical_id_value: The value given to a logical identifier. (BCCM)
logical_id_purpose: The purpose for which a logical identifier is used. (BCCM)

4.2.170 MachineObject

A type of BC_FurnishingElement which has an electrical or mechanical operation. (BCCM)

4.2.171 MakeBuyDecision

A decision taken as to whether an item should be purchased from an external source or fabricated on site. (BCCM)

4.2.172 Manufacturer

The organization or person originally making goods. (BCCM)

4.2.173 MeetingRoom
A type of space used for meetings. (BCCM)

4.2.174 Notch
A section of material cut from the main body of an item to form a feature which can be used for jointing. (152 3411 - notched joint)

4.2.175 OfficeBlock
An aggregation of office spaces in a single building. (BCCM)

4.2.176 OfficeRoom
A single space used as an office. (BCCM)

4.2.177 OfficeSpaceAssembly
An assembly of OfficeRooms. (BCCM)

4.2.178 OfficeSpaceObject
A type of space used as an office. (BCCM)

4.2.179 Organization
An organized body, specifically a business, government department or other agency which influences building construction through actors and persons which it employs. (BCCM)

4.2.180 Parallel
A type of sequence relation whereby one process is carried out concurrently with another process. (BCCM)

4.2.181 ParametricShape
The mathematic parameters which can be applied procedurally to determine the geometry data that describes or defines the spatial and/or volumetric boundaries of an object. (AP225)

4.2.182 ParkingPlace
Area that is prepared and intended for the parking of a number of vehicles (100 1242 - vehicle park)

4.2.183 ParkingSpace
Area intended for the parking of one vehicle. (100 1243 - parking space)

4.2.184 Penthouse
A type of BuildingElementAssembly located as the highest set usable spaces in a building. (BCCM)

4.2.185 Person
A human being associated with the building construction as a BC_Actor in some capacity. (BCCM)

4.2.186 Photograph
A graphical image of something existing. (BCCM)

4.2.187 Pile
Slender structural member substantially underground intended to transmit forces into loadbearing strata below the surface of the ground. (100 3146 - pile)

4.2.188 PipeBend
A change of direction formed in the path of a BC_PipingDistributionObject. (BCCM)

4.2.189 PlaceOrientation

Location of an object described according to the co-ordinate system in use and an angular direction. (BCCM)

Attribute definitions:
located_at: Location of an object described according to the co-ordinate system in use. (BCCM)
oriented_at: Orientation of an object described as an angular direction. (BCCM)

4.2.190 PlantingObject

A type of BC_FurnishingElement which is either an horticultural plant (natural or articial) or an element in which horticultural plants are placed. (BCCM)

4.2.191 PlugSocket

A type of BC_ElectricityDistributionPart acting as a terminal point of the distribution path to which external devices can draw their power requirement. (BCCM)

4.2.192 Point_3D

A 3 dimensional cartesian coordinate.

4.2.193 Precedes

A type of sequence relation whereby one process precedes another process. (BCCM)

4.2.194 Principal

The leading organization or person. (BCCM)

4.2.195 ProduceDrawing

The act of producing a drawing. (BCCM)

4.2.196 QualityClause

A particular of property that bears on ability to satisfy needs. (171 1005 - quality)

Attribute definitions:
quality_clause_description: Text describing the property that bears on ability to satisfy needs.
(171 1005 - quality)
quality_clause_number: A number or other reference dentifying the QualityClause to be used. (BCCM)

4.2.197 RC_bar

A metal bar used as reinforcement in reinforced concrete. (BCCM)

4.2.198 RC_Concrete

A type of BC_Material. (BCCM)

4.2.199 Radiator

A heat emitting device. (BCCM)

4.2.200 ReferenceComplex

An assembly of ReferenceShapes to define a complex shape. (BCCM)

4.2.201 ReferenceFace

The mathematic or topology data that describes or defines a face. (AP225)

4.2.202 ReferenceLine

The mathematic or topology data that describes or defines a line. (AP225)

4.2.203 ReferencePoint

The mathematic or topology data that describes or defines a point. (AP225)

4.2.204   ReferenceShape
The mathematic or topology data that describes or defines the shape of an object independently of the form of explicit shape representation which may be used and from which an explicit shape representation may be derived through the action of geometric generation methods. (AP225)

4.2.205   ReferenceVolume
The mathematic or topology data that describes or defines a volumetric shape. (AP225)

4.2.206   Regulation
A rule prescribed for management, guidance or direction. (Ox)

4.2.207   ResultingResourceObject
Item constructed or manufactured for use as a resource. (BCCM)

4.2.208   Roof
Construction that encloses a building from above. (100 3218 - roof)

4.2.209   RoofSection
A part or section of a roof. (BCCM)

4.2.210   SanitarySpace
A space provided for the purpose of sanitary activities. (BCCM)

4.2.211   SanitarySpaceBlock
A block of SanitarySpaces (BCCM)

4.2.212   Section
A geographically identifiable part of a building. (BCCM)

4.2.213   SeparationConnection
A means of describing the connection of BC_SeparationSystemObjects. (BCCM)

Attribute definitions:
separation_connection_type: Type of SeparationConnection. (BCCM)

4.2.214   Site
A single place where construction processes are carried out. (100 1104 - site)

4.2.215   SiteComplex
An aggregation of places where construction processes are carried out. (100 1104 - site)

4.2.216   SiteElement
A part of a place where construction processes are carried out. (100 1104 - site)

4.2.217   SiteElementAssembly
An assembly of site elements. (BCCM)

4.2.218   Sketch
Drawing in simplified format commonly used to show functional relationships and assembly sequences. (100 5209 - diagram)

4.2.219   Slab

Construction, usually of concrete, horizontal or nearly so, of large area relative to its thickness, (100 3118 - concrete slab)

4.2.220 Soil

A type of BC_Material

4.2.221 SpaceConnection

A means of describing the connection of BC_SpaceObjects. (BCCM)

Attribute definitions:
space_connection_type: Type of SpaceConnection. (BCCM)

4.2.222 SpaceOccupancy

A measure of the occupancy of a space. (BCCM)

Attribute definitions:
number_of_people The number of people occupying a given space. (BCCM)
profile   The occupancy of a space at different times over a given period. (BCCM)

4.2.223 SpecificSpaceObject

A type of space used for specific purposes. (BCCM)

4.2.224 Staircase

Construction that comprises a succession of horizontal stages (steps or landings) that make it possible to pass on foot to other levels. (100 3514 - staircase)

4.2.225 Standard

An authoritative or recognized exemplar of some definite degree of quality. (Ox)

4.2.226 Steel

A type of BC_Material. (BCCM)

4.2.227 SteelProfile

A designation of the cross sectional shape of a prismatic steel BC_StructuralPart. (BCCM)

4.2.228 Storey

An identifiable space in a building between two consecutive floors or between a floor and a roof which is normally identified according to its relative vertical position or level. (100 2102- storey)

4.2.229 StreetFurnitureObject

A type of FittingObject. (BCCM)

4.2.230 StructuralConnection

A means of describing the connection of BC_StructuralObjects. (BCCM)

Attribute definitions:
structural_connection_type: Type of StructuralConnection. (BCCM)

4.2.231 SubStructure

Part of a structure wholly or mainly below the level of the adjoining ground or a given level. (100 1201 - substructure)

4.2.232 Succeeds

A type of sequence relation whereby one process succeeds another process. (BCCM)

4.2.233 SuperStructure

Part of a structure above the SubStructure. (100 1207 - superstructure)

4.2.234 Supplier

The organization or person providing goods or services. (BCCM)

4.2.235   SupportConstructionObject

Item constructed or manufactured for use as a resource. (BCCM)

4.2.236   TechnicalDrawing

Information presented in a graphical manner that may imnclude annotation and which mormally depicts proposed work according to scale and accepted conventions for the presentation of intent. (100 5209 - drawing)

4.2.237   TechnicalSpace

A space provided for the purpose of technical activities. (BCCM)

4.2.238   ThermalInsulationFactor

An InsulationFactor which specifies resistance to heat transmission. (BCCM)

4.2.239   Transformer

Equipment that transfers electrical energy without change of frequency and usually at different values of voltage. (310 5202 - transformer)

4.2.240   Truss

Braced frame designed to act as a beam. (210 6401 - truss)

4.2.241   UnitCost

Cost per unit of products, processes or resources. (156 1013 - unit rate)

Attribute definitions:

factors: A factor applied to a unit cost to account for abnormal circumstances such as additional payments for processes carried out at height, in dirty conditions, additional insurance etc. (BCCM)

4.2.242   WallPanel

A type of BC_SeparationPart

4.2.243   Window

Construction for closing a vertical or near vertical opening or hole that will admit light and may admit fresh air. (100 3303 - window)

4.2.244   Wing

A geographically identifiable part of a building. (BCCM)

4.2.245   Wood

A type of BC_Material. (BCCM)

4.3   Assertions

Each assertion given below shows the number of the ARM EXPRESS-G model in which its primary focus is given as [#XX]

BC_Actor to actor_name.
[#20]

A BC_Actor has one actor_name.

BC_Actor to email_address.
[#20]

A BC_Actor has zero, one or many email_addresses.

BC_Actor to fax_number.
[#20]
A BC_Actor has zero, one or many fax_numbers.

BC_Actor to office_address.
[#20]
A BC_Actor has zero, one or many office_addresses.

BC_Actor to postal_address.
[#20]
A BC_Actor has zero, one or many postal_addresses.

BC_Actor to postal_code.
[#20]
A BC_Actor has zero, one or many postal_codes.

BC_Actor to telephone_number.
[#20]
A BC_Actor has one or many telephone_numbers.

BC_Availability to TimeSlot
[#27]
A BC_Availability is available in one or many TimeSlots. A TimeSlot is the availability of zero, one or many BC_Availabilities.

BC_BuildingObject to BC_FunctionObject
[#16]
A BC_BuildingObject is realised by zero, one or many BC_FunctionObjects. A BC_FunctionObject realises zero or one BC_BuildingObject.

BC_BuildingObject to BC_SiteObject
[#16]
A BC_BuildingObject is located on zero, one or many BC_SiteObjects. A BC_SiteObject locates zero, one or many BC_BuildingObjects.

BC_ClassificationFunction to CharacteristicFunction
[#12]
A BC_ClassificationFunction comprises a list of CharacteristicFunctions. A CharacteristicFunction participates in zero, one or many BC_ClassificationFunctions.

BC_ClassificationFunction to priority   [#12]
A BC_ClassificationFunction has zero or one priority

BC_ConstructionActivity to BC_ConstructionTask
[#33]
A BC_ConstructionActivity consists of one or many BC_ConstructionTasks. A BC_ConstructionTask is part of one BC_ConstructionActivity.

BC_ConstructionActivity to activity_number
[#33]
A BC_ConstructionActivity has zero or one activity_number.

BC_ConstructionProcess to BC_ConstructionActivity
[#33]

A BC_ConstructionProcess consists of zero, one or many BC_ConstructionActivities. A BC_ConstructionActivity is part of one or many BC_ConstructionProcess.

BC_ConstructionTask to task_description
[#33]

A BC_ConstructionTask has zero or one task_description

BC_ConstructionTask to task_number
[#33]

A BC_ConstructionTask has zero or one task_number.

BC_ConstructionTask to earliest_finish_date
[#33]

A BC_ConstructionTask has zero or one earliest_finish_date.

BC_ConstructionTask to earliest_start_date
[#33]
A BC_ConstructionTask has zero or one earliest_start_date.

BC_ConstructionTask to latest_finish_date
[#33]
A BC_ConstructionTask has zero or one latest_finish_date.

BC_ConstructionTask to latest_start_date
[#33]
A BC_ConstructionTask has zero or one latest_start_date.

BC_ControlObject to BC_Actor
[#4]
A BC_ControlObject is issued by one BC_Actor. A BC_Actor issues zero, one or many BC_ControlObjects.

BC_ControlObject to BC_ControlCharacteristic
[#4]
A BC_ControlObject has required zero, one or many BC_ControlCharacteristic.
A BC_ControlObject has proposed zero, one or many BC_ControlCharacteristic.
A BC_ControlObject has planned zero, one or many BC_ControlCharacteristic.
A BC_ControlObject has realised zero, one or many BC_ControlCharacteristic.
A BC_ControlObject has managed zero, one or many BC_ControlCharacteristic.
A BC_ControlCharacteristic requires zero, one or many BC_ControlObjects.
A BC_ControlCharacteristic proposes zero, one or many BC_ControlObjects.
A BC_ControlCharacteristic plans zero, one or many BC_ControlObjects.
A BC_ControlCharacteristic realises zero, one or many BC_ControlObjects.
A BC_ControlCharacteristic manages zero, one or many BC_ControlObjects.

BC_ControlObject to BC_ControlPresentation
[#4]
A BC_ControlObject is presented by zero, one or many BC_ControlPresentations. A BC_ControlPresentation presents zero, one or many BC_ControlObjects.

BC_ControlPresentation to BC_Actor
[#4]
A BC_ControlPresentation is issued by one BC_Actor. A BC_Actor issues zero, one or many BC_ControlPresentations.

BC_ControlPresentation to BC_Status
[#4]
A BC_ControlPresentation has zero or one BC_Status. A BC_Status is the status of zero, one or many BC_ControlPresentations

BC_ControlPresentation to presentation_version
[#4]
A BC_ControlPresentation has zero or one presentation_version.

BC_ControlPresentation to presentation_title
[#4]
A BC_ControlPresentation has zero or one presentation_title.

BC_ControlPresentation to presentation_media
[#4]
A BC_ControlPresentation is presented on one or many presentation_media.

BC_Cost to Discount
[#25]
A Cost is discounted by zero, one or many Discounts. A Discount discounts one BC_Cost.

BC_Cost to actual_currency
[#25]
A BC_Cost is denominated in exactly one actual_currency.

BC_Cost to gross_cost   [#25]
A BC_Cost has zero or one gross_cost.

BC_Cost to net_cost
[#25]
A BC_Cost has zero or one net_cost.

BC_CostSchedule to BC_CostScheduleSection
[#24]
A CostSchedule comprises zero, one or more CostScheduleSections. A CostScheduleSection is part of one CostSchedule.

BC_CostSchedule to cost_schedule_title
[#24]
A CostSchedule has one cost_schedule_title.

BC_CostScheduleElement to BC_Cost
[#24]
A CostScheduleElement has zero or one BC_Cost. A BC_Cost is the cost of zero, one or many CostScheduleElement

BC_CostScheduleElement to element_description
[#24]
A CostScheduleElement has one cost_schedule_element_description

BC_CostScheduleElement to element_qantity
[#24]
A CostScheduleElement has one element_quantity

BC_CostScheduleSection to BC_Cost
[#24]
A CostScheduleSection has zero or one BC_Cost. A BC_Cost is the cost of zero, one or many CostScheduleSection

BC_CostScheduleSection to BC_CostScheduleElement
[#24]
A CostScheduleSection contains zero, one or more CostScheduleElementss. A CostScheduleElement is part of one CostScheduleSection.

BC_CostScheduleSection to section_number
[#24]
A CostScheduleSection has zero or one section_number.

BC_CostScheduleSection to section_title
[#24]
A CostScheduleSection has one section_title.

BC_DesignActivity to BC_DesignTask
[#34]
A BC_DesignActivity consists of one or many BC_DesignTasks. A BC_DesignTask is part of one BC_DesignActivity.

BC_DesignProcess to BC_DesignActivity
[#34]
A BC_DesignProcess consists of zero, one or many BC_DesignActivities. A BC_DesignActivity is part of one or many BC_DesignProcess.

BC_DistributionObject to BC_FunctionObject
[#8]
A BC_DistributionObject is attached to zero, one or many BC_FunctionObjects.
A BC_DistributionObject penetrates zero, one or many BC_FunctionObjects.
A BC_DistributionObject is located in zero, one or many BC_FunctionObjects.
A BC_FunctionObject attaches zero or oneBC_DistributionObjects.
A BC_FunctionObject is penetrated by zero or one BC_DistributionObjects.
A BC_FunctionObject locates zero or one BC_DistributionObjects.

BC_ElectricityDistributionAssembly to BC_ElectricityDistributionAssembly   [#36]
A BC_ElectricityDistributionAssembly consists of zero, one or more BC_ElectricityDistributionAssemblies.

BC_ElectricityDistributionAssembly to BC_ElectricityDistributionPart
[#36]
A BC_ElectricityDistributionAssembly consists of zero, one or more BC_ElectricityDistributionParts. A BC_ElectricityDistributionPart is part of one BC_ElectricityDistributionAssembly.

BC_ElectricityDistributionObject to voltage
[#36]
A BC_ElectricityDistributionObject has zero or one voltage.

BC_FurnishingGroup to BC_FurnishingElement
[#11]
A BC_FurnishingGroup consists of one ormore BC_FurnishingElements. A BC_FurnishingElement is part of one BC_FurnishingGroup.

BC_FurnishingObject to BC_BuildingObject
[#11]
A BC_FurnishingObject is located in zero or one BC_BuildingObject. A BC_BuildingObject locates zero, one or many BC_FurnishingObjects.

BC_FurnishingObject to BC_SeparationObject
[#11]

A BC_FurnishingObject is located on zero or one BC_SeparationObject. A BC_SeparationObject locates zero, one or many BC_FurnishingObjects.

BC_FurnishingObject to BC_SiteObject
[#11]
A BC_FurnishingObject is located on zero or one BC_SiteObject. A BC_SiteObject locates zero, one or many BC_FurnishingObjects.

BC_FurnishingObject to BC_SpaceObject
[#11]
A BC_FurnishingObject is located in zero or one BC_SpaceObject. A BC_SpaceObject locates zero, one or many BC_FurnishingObjects.

BC_GasDistributionAssembly to BC_GasDistributionAssembly
[#40]
A BC_GasDistributionAssembly consists of zero, one or more BC_GasDistributionAssemblies.

BC_GasDistributionAssembly to BC_GasDistributionPart
[#40]
A BC_GasDistributionAssembly consists of zero, one or more BC_GasDistributionParts. A BC_GasDistributionPart is part of one BC_GasDistributionAssembly.

BC_HVAC_Assembly to BC_HVAC_Assembly
[#37]
A BC_HVACAssembly consists of zero, one or more BC_HVACAssemblies.

BC_HVAC_Assembly to BC_HVAC_Part
[#37]
A BC_HVACAssembly consists of zero, one or more BC_HVACParts. A BC_HVACPart is part of one BC_HVACAssembly.

BC_Identification to Logical_id   [#21]
A BC_Identification has zero, one or many Logical_ids.

BC_Identification to physical_id
[#21]
A BC_Identification has zero or one physical_identifier.

BC_Identification to unique_id   [#21]
A BC_Identification has one unique_identifier.

BC_Library to BC_LibraryObject
[#13]
A BC_Library contains one or many BC_LibraryObjects. A BC_LibraryObject is contained in exactly one BC_Library.

BC_Library to protocol   [#13]
A BC_Library has one LibraryAccessProtocol

BC_Library to library_name
[#13]
A BC_Library has exactly one library_name.

BC_Library to version_number [#13]

A BC_Library has zero or one version_number.

BC_LibraryObject to library_address
[#13]

A BC_LibraryObject has one library_address

BC_LogisticProcess to AcquisitionOrder
[#32]

A BC_LogisticProcess issues zero, one or many AcquisitionOrders. An AcquisitionOrder is issued by one BC_LogisticProcess.

BC_LogisticProcess to BC_ControlObject
[#32]

A BC_LogisticProcess acquires zero, one or many BC_ControlObjects. A BC_ControlObject is acquired by one BC_LogisticProcess.

BC_LogisticProcess to BC_ProductObject
[#32]

A BC_LogisticProcess acquires zero, one or many BC_ProductObjects. A BC_ProductObject is acquired by one BC_LogisticProcess.

BC_LogisticProcess to BC_ResourceObject
[#32]

A BC_LogisticProcess acquires zero, one or many BC_ResourceObjects. A BC_ResourceObject is acquired by one BC_LogisticProcess.

BC_LogisticProcess to Remittance
[#32]

A BC_LogisticProcess issues zero, one or many Remittances. A Remittance is issued by one BC_LogisticProcess.

BC_Material to material_name [#26]
A BC_Material has zero or one material_name.

BC_Material to material_reference
[#26]

A BC_Material has zero or one material_reference.

BC_Performance to BC_SpecificationClause
[#29]

A BC_Performance is sppecified in one or more BC_SpecificationClauses. A BC_SpecificationClause species zero or one BC_Performance.

BC_Performance to performance_rating
[#29]

A BC_Performance has zero or one performance_rating.

BC_PipingAssembly to BC_PipingAssembly
[#8]

A BC_PipingAssembly consists of zero, one or many BC_PipingAssemblies

BC_PipingAssembly to BC_PipingPart

[#8]

A BC_PipingAssembly consists of zero, one or many BC_PipingParts. A BC_PipingPart is part of one BC_PipingAssembly.

BC_PipingPart to BC_PipingFeature
[#8]
A BC_PipingPart locates zero, one or many BC_PipingFeatures. A BC_PipingFeature is located by one BC_PipingPart.

BC_Position to Level
[#15]
A BC_Position is situated on zero or one Level.

BC_Position to PlaceOrientation
[#15]
A BC_Position is located by one PlaceOrientation. A PlaceOrientation locates one or more BC_Positions.

BC_Position to dependent_location
[#15]
A BC_Position has zero or one dependent_location.

BC_Position to grid_reference   [#15]
A BC_Position has zero or one grid_reference.

BC_Process Object to BC_Actor
[#2]
A BC_ProcessObject is performed by one or many BC_Actors. A BC_Actor performs zero, one or many BC_ProcessObjects.

BC_ProcessObject to BC_ProcessCharacteristic
[#2]
A BC_ProcessObject has required zero, one or many BC_ProcessCharacteristics
A BC_ProcessObject has proposed zero, one or many BC_ProcessCharacteristics
A BC_ProcessObject has planned zero, one or many BC_ProcessCharacteristics
A BC_ProcessObject has realised zero, one or many BC_ProcessCharacteristics.
A BC_ProcessCharacterisic requires zero, one or many BC_ProcessObject.
A BC_ProcessCharacterisic proposes zero, one or many BC_ProcessObject.
A BC_ProcessCharacterisic plans zero, one or many BC_ProcessObject.
A BC_ProcessCharacterisic realises zero, one or many BC_ProcessObject.

BC_ProcessObject to BC_ProductObject
[#2]
A BC_ProcessObject processes zero, one or many BC_ProcuctObjects.
A BC_ProductObject is processed by zero, one or many BC_ProcessObjects.

BC_ProcessObject to BC_ResourceObject
[#2]
A BC_ProcessObject applies zero, one or many BC_ResourceObject.
A BC_ResourceObject is applied by zero, one or many BC_ProcessObjects.

BC_ProductObject to MakeBuyDecision
[#3]
A BC_ProductObject is controlled by zero or one MakeBuyDecision. A MakeBuyDecision controls zero, one or many BC_ProductObjects.

BC_ProductObject to BC_Position

[#3]

A BC_ProductObject is located by zero or one BC_Position. A BC_Position locates zero, one or many BC_ProductObjects.

BC_ProductObject to BC_ProductCharacteristic
[#3]

A BC_ProductObject has required zero, one or many BC_ProductCharacteristics.
A BC_ProductObject has proposed zero, one or many BC_ProductCharacteristics.
A BC_ProductObject has planned zero, one or many BC_ProductCharacteristics.
A BC_ProductObject has realised zero, one or many BC_ProductCharacteristics.
A BC_ProductObject has managed zero, one or many BC_ProductCharacteristics.
A BC_ProductCharacterisic requires zero, one or many BC_ProductObjects.
A BC_ProductCharacterisic proposes zero, one or many BC_ProductObjects.
A BC_ProductCharacterisic plans zero, one or many BC_ProductObjects.
A BC_ProductCharacterisic realises zero, one or many BC_ProductObjects.
A BC_ProductCharacterisic manages zero, one or many BC_ProductObjects.

BC_Project to Principal   [#1]

A BC_Project has exactly one Principal. A Principal is the principal actore in one or many BC_Projects.

BC_Project to BC_ProjectObject
[#1]

A BC_Project is described by one or many BC_ProjectObjects. A BC_ProjectObject belongs to exactly one BC_Project.

BC_Project to project_name
[#1]

A BC_Project has zero or one project_name.

BC_ProjectObject to BC_Actor   [#1]

A BC_ProjectObject is owned by exactly one BC_Actor. A BC_Actor owns zero, one or many BC_ProjectObjects.

BC_ProjectObject to BC_Classification
[#1]

A BC_ProjectObject is classified by zero, one or many BC_ClassificationFunctions. A BC_ClassificationFunction classifies zero, one or many BC_Objects.

BC_ProjectObject to BC_ControlObject
[#1]

A BC_ProjectObject is controlled by zero, one or more BC_ControlObjects. A BC_ControlObject controls exactly one BC_ProjectObject.

BC_ProjectObject to BC_Identification
[#1]

A BC_ProjectObject is identified by one or many BC_Identifications. A BC_Identification identifies exactly one BC_ProjectObject.

BC_ProjectObject to BC_LibraryObject
[#1]

A BC_ProjectObject references zero, one or many BC_LibraryObjects. A BC_LibraryObject is referenced by zero, one or many BC_Objects.

BC_ProjectObject to BC_ProcessObject
[#1]

A BC_ProjectObject is the result of zero, one or more BC_ProcessObjects. A BC_ProcessObject results in exactly one BC_ProjectObject.

BC_ProjectObject to BC_Status
[#1]
A BC_ProjectObject has zero or one BC_Status. A BC_Status is the status of one or more BC_ProjectObjects.

BC_ProjectObject to bc_name   [#1]
A BC_ProjectObject has zero or one bc_name.

BC_ProjectObject to version_number
[#1]
A BC_ProjectObject has zero or one version_number.

BC_Quality to QualityClause
[#22]
A BC_Quality is specified by one or many QualityClauses. A QualityClause specifies one BC_Quality.

BC_Quality to quality_document_name
[#22]
A BC_Quality has one quality_document_name.

BC_ResourceObject to BC_Position
[#5]
A BC_ResourceObject is positioned at zero or one BC_Position. A BC_Position positions zero, one or many BC_ResourceObjects.

BC_ResourceObject to BC_ResourceCharacteristic
[#5]
A BC_ResourceObject has required zero, one or many BC_ResourceCharacteristics.
A BC_ResourceObject has proposed zero, one or many BC_ResourceCharacteristics.
A BC_ResourceObject has planned zero, one or many BC_ResourceCharacteristics.
A BC_ResourceObject has realised zero, one or many BC_ResourceCharacteristics.
A BC_ResourceCharacteristic requires zero, one or many BC_ResourceObjects.
A BC_ResourceCharacteristic proposes zero, one or many BC_ResourceObjects.
A BC_ResourceCharacteristic plans zero, one or many BC_ResourceObjects.
A BC_ResourceCharacteristic realises zero, one or many BC_ResourceObjects.

BC_SeparationAssembly to BC_SeparationAssembly
[#9]
A BC_SeparationAssembly consists of zero, one or many BC_SeparationAssemblies

BC_SeparationAssembly to BC_SeparationElement
[#9]
A BC_SeparationAssembly consists of zero, one or many BC_SeparationElements. A BC_SeparationElement is part of one BC_SeparationAssembly.

BC_SeparationElement to BC_SeparationPart
[#9]
A BC_SeparationElement consists of zero, one or many BC_SeparationParts. A BC_SeparationPart is part of one BC_SeparationElement.

BC_SeparationFeature to ClosingObject
[#9]
A BC_SeparationFeature is filled by zero or one ClosingObjects. A ClosingObject fills one BC_SeparationFeature.

BC_SeparationObject to BC_FunctionObject
[#9]
A BC_SeparationObject attaches zero, one or many BC_FunctionObjects.
A BC_SeparationObject is penetrated by zero, one or many BC_FunctionObjects.
A BC_SeparationObject locates zero, one or many BC_FunctionObjects.
A BC_SeparationObject separates zero, one or many BC_FunctionObjects.
A BC_FunctionObject is attached to zero or oneBC_SeparationObjects.
A BC_FunctionObject penetrates zero or one BC_SeparationObjects.
A BC_FunctionObject is located by zero or one BC_SeparationObjects.
A BC_FunctionObject is separated by zero or one BC_SeparationObjects.

BC_SeparationObject to InsulationFactor
[#9]
A BC_SeparationObject has zero, one or many InsulationFactors.

BC_SeparationPart to BC_SeparationFeature
[#9]
A BC_SeparationPart locates zero, one or many BC_SeparationFeatures. A BC_SeparationFeature is located by one BC_SeparationPart.

BC_SequenceRelation to BC_ProcessObject
[#2]
A BC_SequenceRelation relates two or more BC_ProcessObjects. A BC_ProcessObject is related by exactly one BC_SequenceRelation.

BC_Shape to BC_ShapeView
[#31]
A BC_Shape is viewed in zero, one or many BC_ShapeViews. A BC_ShapeView is a view of one BC_Shape.

BC_ShapeView to BC_ShapePresentation
[#31]
A BC_ShapeView is presented in one or many BC_ShapePresentations. A BC_ShapePresentation presents one BC_ShapeView.

BC_SiteObject to BC_FunctionObject
[#17]
A BC_SiteObject is realised by zero, one or many BC_FunctionObjects. A BC_FunctionObject realises zero or one BC_SiteObject.

BC_SiteObject to CE_ProductObject
[#17]
A BC_SiteObject locates zero, one or many CE_ProductObjects.
A BC_SiteObject is connected to zero, one or many CE_ProductObjects.
A CE_ProductObject is located by one BC_SiteObject.
A CE_ProductObject connects one BC_SiteObject.

BC_SiteObject to GIS_Position [#17]
A BC_SiteObject is positioned by zero or one GIS_Position. A GIS_Position poitions zero or one BC_SiteObject.

BC_SiteObject to city
[#17]
A BC_SiteObject has zero or one city.

BC_SiteObject to country
[#17]
A BC_SiteObject has zero or one country.

BC_SiteObject to postal_address
[#17]
A BC_SiteObject has zero or one postal_address.

BC_SiteObject to region [#17]

A BC_SiteObject has zero or one region.

BC_SpaceObject to SpaceOccupancy
[#7]

A BC_SpaceObject has zero or one SpaceOccupancy. A SpaceOccupancy is the occupancy of exactly one BC_SpaceObject.

BC_SpaceObject to gross_area
[#7]

A BC_SpaceObject has zero or one gross_area.

BC_SpaceObject to net_area
[#7]

A BC_SpaceObject has zero or one net_area.

BC_Specification to BC_SpecificationSection
[#30]

A BC_Specification consists of zero, one or many BC_SpecificationSections. A BC_SpecificationSection is part of one BC_Specification.

BC_Specification to specification_title
[#30]

A BC_Specification has one specification_title

BC_SpecificationClause to clause_number
[#30]

A BC_SpecificationClause has zero or one clause_number

BC_SpecificationClause to clause_text
[#30]
A BC_SpecificationClause has zero or one clause_texts

BC_SpecificationClause to specification_clause_title
[#30]
A BC_SpecificationClause has zero or one specification_clause_title

BC_SpecificationSection to BC_SpecificationClause
[#30]
A BC_SpecificationSection consists_of one or many BC_SpecificationClauses. A BC_SpecificationClause is included in one BC_SpecificationSection.

BC_SpecificationSection to section_heading
[#30]
A BC_SpecificationSection has one section_heading

BC_SpecificationSection to section_number
[#30]
A BC_SpecificationSection has one section_number

BC_Status to BC_Actor   [#23]
A BC_Status is authorized by one BC_Actor. A BC_Actor authorizes zero, one or many BC_Status.

BC_Status to Date
[#23]
A BC_Status is authorized on one Date.

BC_Status to status_type
[#23]
A BC_Status has one status_type

BC_StructuralAssembly to BC_StructuralAssembly
[#10]
A BC_StructuralAssembly consists of zero, one or many BC_StructuralAssemblies

BC_StructuralAssembly to BC_StructuralElement
[#10]
A BC_StructuralAssembly consists of zero, one or many BC_StructuralElements. A BC_StructuralElement is part of one BC_StructuralAssembly.

BC_StructuralElement to BC_StructuralPart
[#10]
A BC_StructuralElement consists of zero, one or many BC_StructuralParts. A BC_StructuralPart is part of one BC_StructuralElement.

BC_StructuralObject to BC_FunctionObject
[#10]
A BC_StructuralObject attaches zero, one or many BC_FunctionObjects.
A BC_StructuralObject penetrates zero, one or many BC_FunctionObjects.
A BC_StructuralObject locates zero, one or many BC_FunctionObjects.
A BC_StructuralObject supports zero, one or many BC_FunctionObjects.

A BC_FunctionObject is attached to zero or oneBC_StructuralObjects.

A BC_FunctionObject is penetrated by zero or one BC_StructuralObjects.

A BC_FunctionObject is located by zero or one BC_StructuralObjects.

A BC_FunctionObject is supported by zero or one BC_StructuralObjects.

BC_StructuralPart to BC_StructuralFeature
[#10]

A BC_StructuralPart locates zero, one or many BC_StructuralFeatures. A BC_StructuralFeature is located by one BC_StructuralPart.

BC_TabularSchedule to BC_TabularScheduleField
[#28]

A BC_TabularSchedule comprises one or many BC_TabularScheduleFields. A BC_TabularScheduleField is part of zero, one or many BC_TabularSchedules.

BC_TabularSchedule to schedule_title
[#28]
A BC_TabularSchedule has one schedule_title.

BC_TabularScheduleField to field_title
[#28]
A BC_TabularScheduleField has one field_title.

BC_TabularScheduleField to field_type
[#28]
A BC_TabularScheduleField has one field_type.

BC_TabularScheduleField to field_value
[#28]
A BC_TabularScheduleField has zero or one field_value.

BC_Tender to conditions
[#24]
A Tender is conditional on zero, one or many conditions.

BC_Tender to fluctuation_method
[#24]
A Tender has one fluctuation method.

BC_Tender to price_fluctuation_date
[#24]
A Tender has zero or one price_fluctuation date.

BC_TimeFrame to BC_TimeSlot
[#19]
A BC_TimeFrame consists of one or many BC_TimeSlots. A BC_TimeSlot is part of one BC_TimeFrame.

BC_TimeSlot to starting_date
[#27]
A BC_TimeSlot has zero or one starting_date.

BC_TimeSlot to ending_date
[#27]
A BC_TimeSlot has zero or one ending_date.

BC_WiringAssembly to BC_WiringAssembly
[#8]
A BC_WiringAssembly consists of zero, one or many BC_WiringAssemblies

BC_WiringAssembly to BC_WiringPart
[#8]
A BC_WiringAssembly consists of zero, one or many BC_WiringParts. A BC_WiringPart is part of one BC_WiringAssembly.

Building to BuildingElement
[#16]

A Building consists of zero, one or many BuildingElement. A BuildingElement is an element for zero or one Building.

Building to BuildingElementAssembly
[#16]
A Building consists of zero, one or many BuildingElementAssembly. A BuildingElementAssembly is an assembly for one Building.

BuildingComplex to Building
[#16]
A BuildingComplex consists of zero, one or many Buildings. A Building is part of zero or one BuildingComplex.

BuildingElementAssembly to BuildingElement
[#16]
A BuildingElementAssembly consists of zero, one or many BuildingElement. A BuildingElement is an element for zero or one BuildingElementAssembly.

BuildingElementAssembly to BuildingElementAssembly
[#16]
A BuildingElementAssembly consists of zero, one or many BuildingElementAssemblies.

CharacteristicFunction to ClassificationNotation
[#12]
A CharacteristicFunction is notated as one ClassificationNotation

CharacteristicFunction to element_table
[#12]
A CharacteristicFunction is contained in one element_table.

CharacteristicFunction to description
[#12]
A CharacteristicFunction is described by zero or one description.

CharacteristicFunction to publisher
[#12]
A CharacteristicFunction is published by one publisher.

Composite to BC_Material
[#26]
A Composite consists of one or many BC_Materials. A BC_Material is part of zero, one or many Composites.

ContractAgreement to ContractPeriod
[#35]
A ContractAgreement has one ContractPeriod.

ContractAgreement to contract_type
[#35]
A ContractAgreement is of one contract_type.

ContractAgreement to jurisdiction
[#35]
A ContractAgreement has one Jurisdiction.

Discount to discount_purpose [#25]

A discount has zero or one discount_purpose.

Discount to discount_rate
[#25]

A discount has one discount_rate.

DistributionConnection to BC_DistributionObject
[#8]

A DistributionConnection connects two or more BC_DistributionObjects. A BC_DistributionObject is connected to zero, one or many DistributionConnections.

DistributionConnection to distribution_connection_type
[#8]

A DistributionConnection has a distribution_connection_type.

Envelope to Facade
[#9]

An Envelope consists of zero, one or many Facades. A Facade is part of one Envelope.

GeneralSpaceAssembly to GeneralElementarySpace
[#7]

A GeneralSpaceAssembly consists of zero, one or many GeneralElementarySpaces. A GeneralElementarySpace is part of zero or one GeneralSpaceAssemblies.

GIS_Position to elevation
[#17]

A GIS_Position has zero or one elevation.

GIS_Position to latitude [#17]

A GIS_Position has one latitude.

GIS_Position to longitude
[#17]

A GIS_Position has one longitude.

Level to Level
[#15]

A Level belongs to zero or one Level.

Logical_id to logical_id_purpose
[#21]

A Logical_id has exactly one logical_id_purpose

Logical_id to logical_id_value [#21]

A Logical_id has exactly one logical_id_value

OfficeSpaceAssembly to ElementaryOfficeSpace
[#7]

An OfficeSpaceAssembly consists of zero, one or many ElementaryOfficeSpaces. An ElementaryOfficeSpace is part

of exactly one OfficeSpaceAssembliy.

OfficeBlock to BusinessUnit
[#7]
An OfficeBlock consists of zero, one or many BusinessUnits. A BusinessUnit is part of exactly one OfficeBlock.

ParkingSpace to ParkingPlace [#7]
A ParkingSpace consists of zero, one or many ParkingPlaces. A ParkingPlace is part of exactly one ParkingSpace.

PlaceOrientation to Level
[#15]
A PlaceOrientation is located by zero or one Level. A Level locates zero, one or many PlaceOrientations.

PlaceOrientation to orientation [#15]
A PlaceOrientation has one orientation

PlaceOrientation to Point3D
[#15]
A PlaceOrientation is located at a Point3D.

ProduceDrawing to TechnicalDrawing
[#34
ProduceDrawing results in one or more TechnicalDrawings. A TechnicalDrawing is the result of one ProduceDrawing.

QualityClause to quality_clause_description
[#22]
A QualityClause has zero or one quality_clause_description.

QualityClause to quality_clause_number
[#22]
A QualityClause has one quality_clause_number.

ReferenceFace to ReferenceLine
[#31]
A ReferenceFace is defined by zero, one or many ReferenceLines. A ReferenceLine is in zero or one ReferenceFace.

ReferenceLine to ReferencePoint
[#31]
A ReferenceLine is defined by zero, one or many ReferencePoints. A ReferencePoint is in zero or one ReferenceLine.

ReferenceLine to ReferenceVolume
[#31]
A ReferenceLine is in zero or one ReferenceVolume.

ReferencePoint to ReferenceFace
[#31]
A ReferencePoint is in zero or one ReferenceFace.

ReferencePoint to ReferenceVolume
[#31]

A ReferencePoint is in zero or one ReferenceVolume.

ReferenceShape to ExplicitShape
[#31]
A ReferenceShape is represented by zero, one or many ExplicitShapes. A Explicit Shape represents zero or one ReferenceShape.

ReferenceComplex to ReferenceShape
[#31]
A ReferenceComplex consists of one or many ReferenceShapes. A ReferenceShape is part of zero or one ReferenceComplexes.

ReferenceVolume to ReferenceFace
[#31]
A ReferenceVolume is defined by of zero, one or many ReferenceFaces. A ReferenceFace is in zero or one ReferenceVolume.

Roof to RoofSection
[#9]
A Roof consists of zero, one or many RoofSections. A RoofSection is part of one Roof.

SanitarySpaceBlock to SanitarySpace
[#7]
A SanitarySpaceBlock consists of zero, one or many SanitarySpaces. A SanitarySpaceis part of exactly one SanitarySpaceBlocks .

SeparationConnection to BC_SeparationObject
[#9]
A SeparationConnection connects two or more BC_SeparationObjects. A BC_SeparationObject is connected to zero, one or many SeparationConnections.

SeparationConnection to separation_connection_type
[#9]
A SeparationConnection has a separation_connection_type.

Site to SiteElement
[#17]
A Site consists of zero, one or many SiteElements. A SiteElement is an element for zero or one Site.

Site to SiteElementAssembly
[#17]
A Site consists of zero, one or many SiteElementAssemblies. A SiteElementAssembly is an assembly for one Site.

SiteComplex to Site
[#17]
A SiteComplex consists of zero, one or many Sites. A Siteis part of zero or one SiteComplex.

SiteElementAssembly to SiteElement   [#17]
A SiteElementAssembly consists of zero, one or many SiteElements. A SiteElement is an element for zero or one SiteElementAssembly.

SiteElementAssembly to SiteElementAssembly

[#17]

A SiteElementAssembly consists of zero, one or many SiteElementAssemblies.

SpaceConnection to BC_SpaceObject
[#7]

A SpaceConnection connects two or many BC_SpaceObjects. A BC_SpaceObject is connected by zero, one or many SpaceConnections.

SpaceConnection to space_connection_type
[#7]

A SpaceConnection has a space_connection_type.

SpaceOccupancy to number_of_people
[#7]

A SpaceOccupancy has a number_of_people.

SpaceOccupancy to occupancy_profile
[#7]

A SpaceOccupancy has an occupancy_profile.

SpecificSpaceObject to GeneralSpaceObject
[#7]

A SpecificSpaceObject contains zero, one or many SpecificSpaceObjects. A GeneralSpaceObject is contained by zero or one SpecificSpaceObjects.

StructuralConnection to BC_StructuralObject
[#10]

A StructuralConnection connects two or more BC_StructuralObjects. A BC_StructuralObject is connected to zero, one or many StructuralConnections.

StructuralConnection to structural_connection_type
[#10]

A StructuralConnection has a structural_connection_type.

UnitCost to factor   [#25]
A UnitCost has zero, one or many factors.

4.4   ARM EXPRESS Listing

SCHEMA BCCMT100;

TYPE ClassificationFunctionPriority = INTEGER;
END_TYPE;

TYPE ClassificationNotation = STRING;
END_TYPE;

TYPE ContractType = ENUMERATION OF (turnkey, design_and_construct, management, fixed_price, variable_price);
END_TYPE;

```
TYPE DependentLocation = STRING;
END_TYPE;

TYPE Elevation = STRING;
END_TYPE;

TYPE FluctiationMethod = ENUMERATION OF ( fixed, variable);
END_TYPE;

TYPE GridReference = STRING;
END_TYPE;

TYPE Jurisdiction = STRING;
END_TYPE;

TYPE Latidude = STRING;
END_TYPE;

TYPE LibraryAccessProtocol = ENUMERATION OF ( SPF, SDAI, URL, ISO_13584, CORBA);
END_TYPE;

TYPE Longitude = STRING;
END_TYPE;

TYPE Media = ENUMERATION OF ( paper, electronic);
END_TYPE;

TYPE MonetaryAmount = REAL;
END_TYPE;

TYPE OccupancyProfile = REAL;
END_TYPE;

TYPE Orientation = REAL;
END_TYPE;

TYPE PerformanceRating = STRING;
END_TYPE;

TYPE PostalAddress = STRING;
END_TYPE;

TYPE SpaceArea = REAL;
END_TYPE;

TYPE StatusType = ENUMERATION OF ( accepted, rejected, modified, alternative);
END_TYPE;

TYPE TabularScheduleFieldType = ENUMERATION OF ( integer, real, string);
END_TYPE;

TYPE TenderCondition = STRING;
END_TYPE;

TYPE UnitCostFactor = REAL;
END_TYPE;
```

```
ENTITY AcousticInsulationFactor
  SUBTYPE OF (InsulationFactor);
END_ENTITY;

ENTITY AcquiredControlObject
  SUPERTYPE OF (ONEOF( Regulation, Standard, CodeOfPractice))
  SUBTYPE OF (BC_ControlObject);
END_ENTITY;

ENTITY AcquiredResourceObject
  ABSTRACT SUPERTYPE OF (ONEOF( HumanResource, ConstructionAid, ComputerSoftware))
  SUBTYPE OF (BC_ResourceObject);
END_ENTITY;

ENTITY AcquisitionOrder
  SUBTYPE OF (BC_ResultingControlObject);
END_ENTITY;

ENTITY ActualCurrency;
  classified_by              : CurrencyClassification;
END_ENTITY;
```

```
ENTITY BC_Actor
 SUPERTYPE OF (ONEOF( Principal, Manufacturer, Supplier));
 actor_name                : STRING;
 postal_address            : OPTIONAL SET [1:?] OF STRING;
 office_address            : OPTIONAL SET [1:?] OF STRING;
 postal_code        : OPTIONAL SET [1:?] OF STRING;
 telephone_number          : SET [1:?] OF STRING;
 fax_number                : OPTIONAL SET [1:?] OF STRING;
 email_address             : OPTIONAL SET [1:?] OF STRING;
END_ENTITY;


ENTITY BC_Availability
 SUBTYPE OF (BC_ProductCharacteristic, BC_ControlCharacteristic, BC_ResourceCharacteristic);
 available_in              : SET [1:?] OF BC_TimeSlot;
END_ENTITY;


ENTITY BC_Budget
 SUBTYPE OF (BC_CostScheduleObject);
END_ENTITY;


ENTITY BC_BuildingObject
 ABSTRACT SUPERTYPE OF (ONEOF(
  BuildingComplex,  Building, BuildingElementAssembly, BuildingElement))
 SUBTYPE OF (BC_ProductObject);
 located_on                : OPTIONAL SET [1:?] OF BC_SiteObject;
 realized_by               : OPTIONAL SET [1:?] OF BC_FunctionObject;
END_ENTITY;


ENTITY BC_ClassificationFunction;
 functions                 : LIST [1:?] OF CharacteristicFunction;
 priority                  : OPTIONAL ClassificationFunctionPriority;
END_ENTITY;


ENTITY BC_ConstructionActivity
 SUBTYPE OF (BC_ConstructionProcessObject);
 consists_of               : OPTIONAL SET [1:?] OF BC_ConstructionTask;
 activity_number           : OPTIONAL STRING;
END_ENTITY;


ENTITY BC_ConstructionPlan
 SUBTYPE OF (BC_ResultingControlObject);
END_ENTITY;


ENTITY BC_ConstructionProcess
 SUBTYPE OF (BC_ConstructionProcessObject);
 consists_of               : OPTIONAL SET [1:?] OF BC_ConstructionActivity;
END_ENTITY;


ENTITY BC_ConstructionProcessObject
 SUPERTYPE OF (ONEOF( BC_ConstructionActivity, BC_ConstructionProcess, BC_ConstructionTask))
 SUBTYPE OF (BC_ProcessObject);
END_ENTITY;


ENTITY BC_ConstructionTask
 SUBTYPE OF (BC_ConstructionProcessObject);
 task_number               : OPTIONAL STRING;
 task_description          : OPTIONAL STRING;
```

```
END_ENTITY;

ENTITY BC_ControlCharacteristic
  SUPERTYPE OF (ONEOF( BC_Cost, BC_Availability));
END_ENTITY;

ENTITY BC_ControlObject
  ABSTRACT SUPERTYPE OF (ONEOF( BC_AcquiredControlObject, BC_ResultingControlObject))
  SUBTYPE OF (BC_ProjectObject);
  realised              : OPTIONAL SET [1:?] OF BC_ControlCharacteristic;
  planned               : OPTIONAL SET [1:?] OF BC_ControlCharacteristic;
  presented_by          : OPTIONAL SET [1:?] OF BC_ControlPresentation;
  proposed              : OPTIONAL SET [1:?] OF BC_ControlCharacteristic;
  required              : OPTIONAL SET [1:?] OF BC_ControlCharacteristic;
  issued_by             : BC_Actor;
INVERSE
  controls              : BC_ProjectObject FOR controlled_by;
END_ENTITY;

ENTITY BC_ControlPresentation;
  presentation_media    : OPTIONAL Media;
  owned_by        : BC_Actor;
  presentation_status    : OPTIONAL BC_Status;
  presentation_version   : OPTIONAL STRING;
  presentation_title     : OPTIONAL STRING;
END_ENTITY;

ENTITY BC_Cost
  ABSTRACT SUPERTYPE OF (ONEOF( ItemCost, UnitCost))
  SUBTYPE OF (BC_ProcessCharacteristic, BC_ProductCharacteristic, BC_ControlCharacteristic,
BC_ResourceCharacteristic);
  net_cost              : OPTIONAL MonetaryAmount;
  gross_cost            : OPTIONAL MonetaryAmount;
  discounted_by         : OPTIONAL SET [1:?] OF Discount;
  actual_currency       : ActualCurrency;
END_ENTITY;

ENTITY BC_CostSchedule
  SUBTYPE OF (BC_CostScheduleObject);
  consists_of           : OPTIONAL SET [1:?] OF BC_CostScheduleSection;
  cost_schedule_title   : STRING;
END_ENTITY;

ENTITY BC_CostScheduleElement
  SUBTYPE OF (BC_CostScheduleObject);
  element_cost          : OPTIONAL BC_Cost;
  element_quanity       : STRING;
  element_description   : OPTIONAL STRING;
END_ENTITY;

ENTITY BC_CostScheduleObject
  ABSTRACT SUPERTYPE OF (ONEOF( BC_Budget, BC_Tender))
  SUBTYPE OF (BC_ResultingControlObject);
END_ENTITY;
```

```
ENTITY BC_CostScheduleSection
 SUBTYPE OF (BC_CostScheduleObject);
 consists_of                : OPTIONAL SET [1:?] OF BC_CostScheduleElement;
 section_cost      : OPTIONAL BC_Cost;
 section_title              : STRING;
 section_number             : OPTIONAL STRING;
END_ENTITY;


ENTITY BC_DesignActivity
 SUPERTYPE OF (ONEOF( DesignSpacialLayout))
 SUBTYPE OF (BC_DesignProcessObject);
 consists_of                : OPTIONAL SET [1:?] OF BC_DesignTask;
END_ENTITY;


ENTITY BC_DesignProcess
 SUBTYPE OF (BC_DesignProcessObject);
 consists_of                : OPTIONAL SET [1:?] OF BC_DesignActivity;
END_ENTITY;


ENTITY BC_DesignProcessObject
 SUPERTYPE OF (ONEOF( BC_DesignProcess, BC_DesignActivity, BC_DesignTask))
 SUBTYPE OF (BC_ProcessObject);
END_ENTITY;


ENTITY BC_DesignTask
 SUPERTYPE OF (ONEOF( ProduceDrawing))
 SUBTYPE OF (BC_DesignProcessObject);
END_ENTITY;


ENTITY BC_DetectionSignalDistributionObject
 SUBTYPE OF (BC_SignalDistributionObject);
END_ENTITY;


ENTITY BC_DistributionObject
 SUPERTYPE OF (ONEOF(
   BC_HVAC_Object, BC_ElectricityDistributionObject, BC_WaterDistributionObject, BC_SignalDistributionObject,
   BC_GasDistributionObject))
 SUBTYPE OF (BC_FunctionObject);
 located_in                 : OPTIONAL SET [1:?] OF BC_FunctionObject;
 attached_to        : OPTIONAL SET [1:?] OF BC_FunctionObject;
 penetrates                 : OPTIONAL SET [1:?] OF BC_FunctionObject;
INVERSE
 is_connected_to            : DistributionConnection FOR connects;
END_ENTITY;


ENTITY BC_ElectricityDistributionAssembly
 SUBTYPE OF (BC_ElectricityDistributionObject);
 consists_of                : OPTIONAL SET [1:?] OF BC_ElectricityDistributionPart;
 consists_of                : OPTIONAL SET [1:?] OF BC_ElectricityDistributionAssembly;
END_ENTITY;


ENTITY BC_ElectricityDistributionObject
 SUPERTYPE OF (ONEOF( BC_ElectricityDistributionPart, BC_ElectricityDistributionAssembly))
 SUBTYPE OF (BC_DistributionObject);
 voltage          : OPTIONAL INTEGER;
END_ENTITY;
```

```
ENTITY BC_ElectricityDistributionPart
  SUPERTYPE OF (ONEOF( PlugSocket, Transformer, InsulationPipe, LightSwitch))
  SUBTYPE OF (BC_ElectricityDistributionObject);
END_ENTITY;

ENTITY BC_FunctionObject
  ABSTRACT SUPERTYPE OF (ONEOF( BC_SeparationObject, BC_SpaceObject, BC_StructuralObject,
    BC_DistributionObject, BC_FurnishingObject))
  SUBTYPE OF (BC_ProductObject);
END_ENTITY;

ENTITY BC_FurnishingElement
  SUPERTYPE OF (ONEOF( FurnitureObject, DecorationObject, PlantingObject, MachineObject, FittingObject))
  SUBTYPE OF (BC_FurnishingObject);
INVERSE
  element_of_group        : BC_FurnishingGroup FOR consists_of;
END_ENTITY;

ENTITY BC_FurnishingGroup
  SUBTYPE OF (BC_FurnishingObject);
  consists_of             : OPTIONAL SET [1:?] OF BC_FurnishingElement;
END_ENTITY;

ENTITY BC_FurnishingObject
  ABSTRACT SUPERTYPE OF (ONEOF( BC_FurnishingGroup, BC_FurnishingElement))
  SUBTYPE OF (BC_FunctionObject);
  located_in_space        : OPTIONAL SET [1:?] OF BC_SpaceObject;
  located_on_separation   : OPTIONAL SET [1:?] OF BC_SeparationObject;
  located_on_site         : OPTIONAL SET [1:?] OF BC_SiteObject;
  located_in_building     : OPTIONAL SET [1:?] OF BC_BuildingObject;
END_ENTITY;

ENTITY BC_GasDistributionAssembly
  SUBTYPE OF (BC_GasDistributionObject);
  consists_of             : OPTIONAL SET [1:?] OF BC_GasDistributionAssembly;
  consists_of             : OPTIONAL SET [1:?] OF BC_GasDistributionPart;
END_ENTITY;

ENTITY BC_GasDistributionObject
  SUPERTYPE OF (ONEOF( BC_GasDistributionPart, BC_GasDistributionAssembly))
  SUBTYPE OF (BC_DistributionObject);
END_ENTITY;

ENTITY BC_GasDistributionPart
  SUPERTYPE OF (ONEOF( LPG_Tanlk))
  SUBTYPE OF (BC_GasDistributionObject);
END_ENTITY;

ENTITY BC_HVAC_Assembly
  SUBTYPE OF (BC_HVAC_Object);
  consists_of             : OPTIONAL SET [1:?] OF BC_HVAC_Part;
  consists_of             : OPTIONAL SET [1:?] OF BC_HVAC_Assembly;
END_ENTITY;

ENTITY BC_HVAC_Object
  SUPERTYPE OF (ONEOF( BC_HVAC_Part, BC_HVAC_Assembly))
  SUBTYPE OF (BC_DistributionObject);
```

END_ENTITY;

ENTITY BC_HVAC_Part
 SUPERTYPE OF (ONEOF(Radiator, Boiler, HeatExchanger))
 SUBTYPE OF (BC_HVAC_Object);
END_ENTITY;

ENTITY BC_Identification;
 unique_id   : STRING;
 physical_id   : OPTIONAL STRING;
 logical_id   : OPTIONAL Logical_Id;
END_ENTITY;

ENTITY BC_Library;
 protocol   : LibraryAccessProtocol;
 contains   : SET [1:?] OF BC_LibraryObject;
 version_number   : OPTIONAL STRING;
 library_name   : STRING;
END_ENTITY;

ENTITY BC_LibraryObject;
 library_address   : STRING;
END_ENTITY;

ENTITY BC_LogisticProcessObject
 SUPERTYPE OF (ONEOF(BC_ProcurementObject, BC_TransportationObject))
 SUBTYPE OF (BC_ProcessObject);
 acquires_products   : OPTIONAL SET [1:?] OF BC_ProductObject;
 acquires_resources   : OPTIONAL SET [1:?] OF BC_ResourceObject;
 acquires_controls   : OPTIONAL SET [1:?] OF BC_ControlObject;
 issues_orders   : OPTIONAL SET [1:?] OF AcquisitionOrder;
 issues_remittance   : OPTIONAL SET [1:?] OF BC_Remittance;
END_ENTITY;

ENTITY BC_Material
 SUPERTYPE OF (ONEOF(Steel, RC_Concrete, Composite, Brick, Soil, Wood))
 SUBTYPE OF (BC_ProductCharacteristic);
 material_name   : OPTIONAL STRING;
 material_reference   : OPTIONAL STRING;
END_ENTITY;

ENTITY BC_Performance
 SUBTYPE OF (BC_ProductCharacteristic, BC_ResourceCharacteristic);
 specified_in_clause   : SET [1:?] OF BC_SpecificationClause;
 performance_rating   : OPTIONAL PerformanceRating;
END_ENTITY;

ENTITY BC_PipingAssembly
 SUBTYPE OF (BC_PipingObject);
 consists_of   : OPTIONAL SET [1:?] OF BC_PipingPart;
 consists_of   : OPTIONAL SET [1:?] OF BC_PipingAssembly;
END_ENTITY;

ENTITY BC_PipingFeature
 SUPERTYPE OF (ONEOF(PipeBend))
 SUBTYPE OF (BC_PipingObject);
END_ENTITY;

```
ENTITY BC_PipingObject
  SUPERTYPE OF (ONEOF( BC_PipingAssembly, BC_PipingPart, BC_PipingFeature))
  SUBTYPE OF (BC_DistributionObject);
END_ENTITY;


ENTITY BC_PipingPart
  SUBTYPE OF (BC_PipingObject);
  locates_feature              : OPTIONAL SET [1:?] OF BC_PipingFeature;
END_ENTITY;


ENTITY BC_Position;
  gridreference        : OPTIONAL GridReference;
  dependent_location           : OPTIONAL SET [1:?] OF DependentLocation;
  located_by                   : PlaceOrientation;
  situated_on_level            : OPTIONAL Level;
END_ENTITY;


ENTITY BC_ProcessCharacteristic
  ABSTRACT SUPERTYPE OF (ONEOF( BC_Quality, BC_Cost, BC_TimeFrame));
END_ENTITY;


ENTITY BC_ProcessObject
  ABSTRACT SUPERTYPE OF (ONEOF(
    BC_DesignProcessObject, BC_ConstructionProcessObject, BC_LogisticProcessObject))
  SUBTYPE OF (BC_ProjectObject);
  required                     : OPTIONAL SET [1:?] OF BC_ProcessCharacteristic;
  proposed                     : OPTIONAL SET [1:?] OF BC_ProcessCharacteristic;
  realised                     : OPTIONAL SET [1:?] OF BC_ProcessCharacteristic;
  planned                      : OPTIONAL SET [1:?] OF BC_ProcessCharacteristic;
  applies                      : OPTIONAL SET [1:?] OF BC_ResourceObject;
  processes                    : OPTIONAL SET [1:?] OF BC_ProductObject;
  performed_by                 : OPTIONAL SET [1:?] OF BC_Actor;
INVERSE
  results_in                   : BC_ProjectObject FOR result_of;
  is_related_by        : BC_SequenceRelation FOR relates_process;
END_ENTITY;


ENTITY BC_ProcurementObject
  SUBTYPE OF (BC_LogisticProcessObject);
END_ENTITY;


ENTITY BC_ProductCharacteristic
  ABSTRACT SUPERTYPE OF (ONEOF(
    BC_Quality, BC_Cost, BC_Shape, BC_Material, BC_Availability, BC_Performance));
END_ENTITY;


ENTITY BC_ProductObject
  ABSTRACT SUPERTYPE OF (ONEOF( BC_BuildingObject, BC_SiteObject, BC_FunctionObject))
  SUBTYPE OF (BC_ProjectObject);
  managed          : OPTIONAL SET [1:?] OF BC_ProductCharacteristic;
  realised                     : OPTIONAL SET [1:?] OF BC_ProductCharacteristic;
  proposed                     : OPTIONAL SET [1:?] OF BC_ProductCharacteristic;
  required                     : OPTIONAL SET [1:?] OF BC_ProductCharacteristic;
  positioned_at        : OPTIONAL BC_Position;
  planned                      : OPTIONAL SET [1:?] OF BC_ProductCharacteristic;
  controlled_by        : OPTIONAL MakeBuyDecision;
END_ENTITY;
```

```
ENTITY BC_Project;
 described_by               : SET [1:?] OF BC_ProjectObject;
 principal                  : Principal;
 project_name               : OPTIONAL STRING;
END_ENTITY;


ENTITY BC_ProjectObject
 ABSTRACT SUPERTYPE OF (ONEOF(
      BC_ProcessObject, BC_ProductObject,  BC_ResourceObject,  BC_ControlObject));
 identified_by              : SET [1:?] OF BC_Identification;
 classified_by              : OPTIONAL SET [1:?] OF BC_ClassificationFunction;
 library_references         : OPTIONAL SET [1:?] OF BC_LibraryObject;
 owned_by_actor             : BC_Actor;
 status                     : OPTIONAL BC_Status;
 controlled_by      : OPTIONAL SET [1:?] OF BC_ControlObject;
 result_of                  : OPTIONAL SET [1:?] OF BC_ProcessObject;
 bc_name                    : OPTIONAL STRING;
 version_number             : OPTIONAL STRING;
END_ENTITY;


ENTITY BC_Quality
 SUBTYPE OF (BC_ProcessCharacteristic, BC_ProductCharacteristic, BC_ResourceCharacteristic);
 quality_document_name: STRING;
 quality_clause             : SET [1:?] OF QualityClause;
END_ENTITY;


ENTITY BC_Remittance;
END_ENTITY;


ENTITY BC_ResourceCharacteristic
 ABSTRACT SUPERTYPE OF (ONEOF( BC_Availability, BC_Performance, BC_Quality, BC_Cost));
END_ENTITY;


ENTITY BC_ResourceObject
 ABSTRACT SUPERTYPE OF (ONEOF( ResultingResourceObject, AcquiredResourceObject))
 SUBTYPE OF (BC_ProjectObject);
 realised                   : OPTIONAL SET [1:?] OF BC_ResourceCharacteristic;
 proposed                   : OPTIONAL SET [1:?] OF BC_ResourceCharacteristic;
 required                   : OPTIONAL SET [1:?] OF BC_ResourceCharacteristic;
 planned                    : OPTIONAL SET [1:?] OF BC_ResourceCharacteristic;
 positioned_at      : OPTIONAL BC_Position;
END_ENTITY;


ENTITY BC_ResultingControlObject
 SUPERTYPE OF (ONEOF(
   ContractAgreement, BC_ConstructionPlan, BC_ShapePresentation, AcquisitionOrder, ChangeOrder,
   BC_CostScheduleObject, ClientBrief, BillOfMaterials, BC_SpecificationObject, BC_TabularSchedule,
   MakeBuyDecision))
 SUBTYPE OF (BC_ControlObject);
END_ENTITY;


ENTITY BC_SeparationAssembly
 SUPERTYPE OF (ONEOF( Envelope, RoofSection, Facade, Roof))
 SUBTYPE OF (BC_SeparationObject);
 consists_of                : OPTIONAL SET [1:?] OF BC_SeparationElement;
 consists_of                : OPTIONAL SET [1:?] OF BC_SeparationAssembly;
END_ENTITY;
```

```
ENTITY BC_SeparationElement
 SUPERTYPE OF (ONEOF( Floor, InnerWall))
 SUBTYPE OF (BC_SeparationObject);
 consists_of                : OPTIONAL SET [1:?] OF BC_SeparationPart;
END_ENTITY;


ENTITY BC_SeparationFeature
 SUPERTYPE OF (ONEOF( Channel, Hole))
 SUBTYPE OF (BC_SeparationObject);
 filled_by                  : OPTIONAL SET [1:?] OF ClosingObject;
END_ENTITY;


ENTITY BC_SeparationObject
 ABSTRACT SUPERTYPE OF (ONEOF(
   BC_SeparationPart, BC_SeparationElement, BC_SeparationAssembly, BC_SeparationFeature))
 SUBTYPE OF (BC_FunctionObject);
 separates                  : OPTIONAL SET [1:?] OF BC_FunctionObject;
 attaches                   : OPTIONAL SET [1:?] OF BC_FunctionObject;
 locates                    : OPTIONAL SET [1:?] OF BC_FunctionObject;
 is_penetrated_by           : OPTIONAL SET [1:?] OF BC_FunctionObject;
 insulation_factor          : OPTIONAL SET [1:?] OF InsulationFactor;
INVERSE
 is_connected_by            : SeparationConnection FOR connects;
END_ENTITY;


ENTITY BC_SeparationPart
 SUPERTYPE OF (ONEOF( WallPanel, ClosingObject, GypsumPlate))
 SUBTYPE OF (BC_SeparationObject);
 locates_feature            : OPTIONAL SET [1:?] OF BC_SeparationFeature;
END_ENTITY;


ENTITY BC_SequenceRelation
 SUPERTYPE OF (ONEOF( Precedes, Parallel, Succeeds));
 relates_process            : OPTIONAL SET [2:?] OF BC_ProcessObject;
END_ENTITY;


ENTITY BC_Shape
 SUPERTYPE OF (ONEOF( ReferenceShape, ExplicitShape, ParametricShape))
 SUBTYPE OF (BC_ProductCharacteristic);
 viewed_in                  : OPTIONAL SET [1:?] OF BC_ShapeView;
END_ENTITY;


ENTITY BC_ShapePresentation
 SUPERTYPE OF (ONEOF( TechnicalDrawing, Sketch, Photograph))
 SUBTYPE OF (BC_ResultingControlObject);
END_ENTITY;


ENTITY BC_ShapeView;
 presented_in               : SET [1:?] OF BC_ShapePresentation;
END_ENTITY;


ENTITY BC_SignalDistributionObject
 SUPERTYPE OF (ONEOF( BC_TV_SignalDistributionObject, BC_DetectionSignalDistributionObject))
 SUBTYPE OF (BC_DistributionObject);
END_ENTITY;
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```
ENTITY BC_SiteObject
 ABSTRACT SUPERTYPE OF (ONEOF( SiteComplex, Site, SiteElementAssembly))
 SUBTYPE OF (BC_ProductObject);
 realized_by              : OPTIONAL SET [1:?] OF BC_FunctionObject;
 gis_position             : OPTIONAL GIS_Position;
 postal_address           : OPTIONAL PostalAddress;
 city                     : OPTIONAL STRING;
 region                   : OPTIONAL STRING;
 country                  : OPTIONAL STRING;
END_ENTITY;

ENTITY BC_SpaceObject
 ABSTRACT SUPERTYPE OF (ONEOF( GeneralSpaceObject, SpecificSpaceObject))
 SUBTYPE OF (BC_FunctionObject);
 gross_area       : OPTIONAL SpaceArea;
 net_area                 : OPTIONAL SpaceArea;
 occupancy                : OPTIONAL SpaceOccupancy;
INVERSE
 is_connected_by          : SpaceConnection FOR connects;
END_ENTITY;

ENTITY BC_Specification
 SUBTYPE OF (BC_SpecificationObject);
 consists_of              : OPTIONAL SET [1:?] OF BC_SpecificationSection;
 specification_title  : STRING;
END_ENTITY;

ENTITY BC_SpecificationClause
 SUBTYPE OF (BC_SpecificationObject);
 clause_number            : OPTIONAL STRING;
 clause_text              : OPTIONAL STRING;
 specification_clause_title    : OPTIONAL STRING;
END_ENTITY;

ENTITY BC_SpecificationObject
 ABSTRACT SUPERTYPE OF (ONEOF( BC_Specification, BC_SpecificationSection, BC_SpecificationClause))
 SUBTYPE OF (BC_ResultingControlObject);
END_ENTITY;

ENTITY BC_SpecificationSection
 SUBTYPE OF (BC_SpecificationObject);
 consists_of              : OPTIONAL SET [1:?] OF BC_SpecificationClause;
 section_number           : STRING;
 section_heading          : STRING;
END_ENTITY;

ENTITY BC_Status;
 authorized_by            : BC_Actor;
 status                   : StatusType;
 authorization_date       : Date;
END_ENTITY;

ENTITY BC_StructuralAssembly
 SUPERTYPE OF (ONEOF( Frame, Foundation, Core, Truss, SuperStructure, SubStructure))
 SUBTYPE OF (BC_StructuralObject);
 consists_of              : OPTIONAL SET [1:?] OF BC_StructuralElement;
 consists_of              : OPTIONAL SET [1:?] OF BC_StructuralAssembly;
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```
END_ENTITY;

ENTITY BC_StructuralElement
  SUPERTYPE OF (ONEOF( Cable, Pile, Brace, LoadbearingWall, Slab, Column, Beam, Connector))
  SUBTYPE OF (BC_StructuralObject);
  consists_of                : OPTIONAL SET [1:?] OF BC_StructuralPart;
END_ENTITY;

ENTITY BC_StructuralFeature
  SUPERTYPE OF (ONEOF( Notch))
  SUBTYPE OF (BC_StructuralObject);
END_ENTITY;

ENTITY BC_StructuralObject
  ABSTRACT SUPERTYPE OF (ONEOF(
    BC_StructuralFeature, BC_StructuralPart, BC_StructuralElement, BC_StructuralAssembly))
  SUBTYPE OF (BC_FunctionObject);
  locates                    : OPTIONAL SET [1:?] OF BC_FunctionObject;
  penetrates                 : OPTIONAL SET [1:?] OF BC_FunctionObject;
  attaches                   : OPTIONAL SET [1:?] OF BC_FunctionObject;
  is_penetrated_by           : OPTIONAL SET [1:?] OF BC_FunctionObject;
INVERSE
  is_connected_by            : StructuralConnection FOR connects;
END_ENTITY;

ENTITY BC_StructuralPart
  SUPERTYPE OF (ONEOF( SteelProfile, ConcreteBody, RC_bar))
  SUBTYPE OF (BC_StructuralObject);
  locates_feature            : OPTIONAL SET [1:?] OF BC_StructuralFeature;
END_ENTITY;

ENTITY BC_TV_SignalDistributionObject
  SUBTYPE OF (BC_SignalDistributionObject);
END_ENTITY;

ENTITY BC_TabularSchedule
  SUBTYPE OF (BC_ResultingControlObject);
  comprises                  : SET [1:?] OF BC_TabularScheduleField;
  schedule_title      : STRING;
END_ENTITY;

ENTITY BC_TabularScheduleField;
  field_title                : STRING;
  field_type                 : TabularScheduleFieldType;
  field_values        : OPTIONAL STRING;
END_ENTITY;

ENTITY BC_TapWaterDistributionObject
  SUBTYPE OF (BC_WaterDistributionObject);
END_ENTITY;

ENTITY BC_Tender
  SUBTYPE OF (BC_CostScheduleObject);
  conditions                 : OPTIONAL SET [1:?] OF TenderCondition;
  price_fluctiation_date     : OPTIONAL Date;
  method                     : OPTIONAL FluctiationMethod;
END_ENTITY;
```

```
ENTITY BC_TimeFrame
 SUBTYPE OF (BC_ProcessCharacteristic);
 consists_of                : SET [1:?] OF BC_TimeSlot;
END_ENTITY;

ENTITY BC_TimeSlot;
 starting_date    : Date;
 ending_date             : Date;
END_ENTITY;

ENTITY BC_TransportationObject
 SUBTYPE OF (BC_LogisticProcessObject);
END_ENTITY;

ENTITY BC_WasteWaterDistributionObject
 SUBTYPE OF (BC_WaterDistributionObject);
END_ENTITY;

ENTITY BC_WaterDistributionObject
 SUPERTYPE OF (ONEOF( BC_TapWaterDistributionObject, BC_WasteWaterDistributionObject))
 SUBTYPE OF (BC_DistributionObject);
END_ENTITY;

ENTITY BC_WiringAssembly
 SUBTYPE OF (BC_WiringObject);
 consists_of               : OPTIONAL SET [1:?] OF BC_WiringPart;
 consists_of               : OPTIONAL SET [1:?] OF BC_WiringAssembly;
END_ENTITY;

ENTITY BC_WiringObject
 SUPERTYPE OF (ONEOF( BC_WiringAssembly, BC_WiringPart))
 SUBTYPE OF (BC_DistributionObject);
END_ENTITY;

ENTITY BC_WiringPart
 SUBTYPE OF (BC_WiringObject);
END_ENTITY;

ENTITY Beam
 SUBTYPE OF (BC_StructuralElement);
END_ENTITY;

ENTITY BillOfMaterials
 SUBTYPE OF (BC_ResultingControlObject);
END_ENTITY;

ENTITY Block
 SUBTYPE OF (BuildingElementAssembly);
END_ENTITY;

ENTITY Boiler
 SUBTYPE OF (BC_HVAC_Part);
END_ENTITY;

ENTITY Brace
 SUBTYPE OF (BC_StructuralElement);
END_ENTITY;
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ENTITY Brick
  SUBTYPE OF (BC_Material);
END_ENTITY;

ENTITY Building
  SUBTYPE OF (BC_BuildingObject);
  consists_of                : OPTIONAL SET [1:?] OF BuildingElementAssembly;
  consists_of                : OPTIONAL SET [1:?] OF BuildingElement;
END_ENTITY;

ENTITY BuildingComplex
  SUBTYPE OF (BC_BuildingObject);
  consists_of                : OPTIONAL SET [1:?] OF Building;
END_ENTITY;

ENTITY BuildingElement
  SUBTYPE OF (BC_BuildingObject);
INVERSE
  element_of_assembly        : BuildingElementAssembly FOR consists_of;
  element_of_building        : Building FOR consists_of;
END_ENTITY;

ENTITY BuildingElementAssembly
  SUPERTYPE OF (ONEOF( Wing, Section, Block, Storey, Penthouse, Cellar))
  SUBTYPE OF (BC_BuildingObject);
  consists_of                : OPTIONAL SET [1:?] OF BuildingElement;
  consists_of                : OPTIONAL SET [1:?] OF BuildingElementAssembly;
INVERSE
  assembly_o_building        : Building FOR consists_of;
  Assembly_of_assembly       : BuildingElementAssembly FOR consists_of;
END_ENTITY;

ENTITY BusinessUnit
  SUBTYPE OF (OfficeSpaceAssembly);
END_ENTITY;

ENTITY Cable
  SUBTYPE OF (BC_StructuralElement);
END_ENTITY;

ENTITY Cellar
  SUBTYPE OF (BuildingElementAssembly);
END_ENTITY;
ENTITY Channel
  SUBTYPE OF (BC_SeparationFeature);
END_ENTITY;

ENTITY ChangeOrder
  SUBTYPE OF (BC_ResultingControlObject);
END_ENTITY;

ENTITY CharacteristicFunction;
  notation                   : ClassificationNotation;
  publisher                  : STRING;
  element_table              : STRING;
END_ENTITY;
```

```
ENTITY CirculationSpace
 SUPERTYPE OF (ONEOF( Corridor, Staircase, Hall, LiftShaft))
 SUBTYPE OF (GeneralElementarySpace);
END_ENTITY;

ENTITY ClientBrief
 SUBTYPE OF (BC_ResultingControlObject);
END_ENTITY;

ENTITY ClosingObject
 SUPERTYPE OF (ONEOF( Window, Door))
 SUBTYPE OF (BC_SeparationPart);
END_ENTITY;

ENTITY CodeOfPractice
 SUBTYPE OF (BC_AcquiredControlObject);
END_ENTITY;

ENTITY Column
 SUBTYPE OF (BC_StructuralElement);
END_ENTITY;

ENTITY Composite
 SUBTYPE OF (BC_Material);
 consists_of                    : SET [1:?] OF BC_Material;
END_ENTITY;

ENTITY ComputerSoftware
 SUBTYPE OF (AcquiredResourceObject);
END_ENTITY;

ENTITY ConcreteBody
 SUBTYPE OF (BC_StructuralPart);
END_ENTITY;

ENTITY Connector
 SUBTYPE OF (BC_StructuralElement);
END_ENTITY;

ENTITY ConstructionAid
 SUBTYPE OF (AcquiredResourceObject);
END_ENTITY;

ENTITY ConstructionPit
 SUBTYPE OF (SiteElementAssembly);
END_ENTITY;

ENTITY ContractAgreement
 SUBTYPE OF (BC_ResultingControlObject);
 contract_type     : ContractType;
 jurisdiction                   : Jurisdiction;
 contract_period                : ContractPeriod;
END_ENTITY;

ENTITY ContractPeriod;
END_ENTITY;
```

```
ENTITY Core
 SUBTYPE OF (BC_StructuralAssembly);
END_ENTITY;

ENTITY Corridor
 SUBTYPE OF (CirculationSpace);
END_ENTITY;

ENTITY CurrencyClassification;
END_ENTITY;

ENTITY Date
 ABSTRACT SUPERTYPE;
 day                        : STRING;
 month                      : STRING;
 year                       : STRING;
END_ENTITY;

ENTITY DecorationObject
 SUBTYPE OF (BC_FurnishingElement);
END_ENTITY;

ENTITY Discount;
 discount_rate     : STRING;
 discount_purpose           : OPTIONAL STRING;
END_ENTITY;

ENTITY DistributionConnection;
 connects                   : OPTIONAL SET [2:?] OF BC_DistributionObject;
 distribution_connection_type        : OPTIONAL STRING;
END_ENTITY;

ENTITY Door
 SUBTYPE OF (ClosingObject);
END_ENTITY;

ENTITY DwellingSpaceObject
 SUBTYPE OF (SpecificSpaceObject);
END_ENTITY;

ENTITY ElementaryOfficeSpace
 SUPERTYPE OF (ONEOF( OfficeRoom, MeetingRoom))
 SUBTYPE OF (OfficeSpaceObject);
END_ENTITY;

ENTITY Envelope
 SUBTYPE OF (BC_SeparationAssembly);
 consists_of                : OPTIONAL SET [1:?] OF Facade;
END_ENTITY;

ENTITY ExplicitShape
 SUBTYPE OF (BC_Shape);
END_ENTITY;

ENTITY Facade
 SUBTYPE OF (BC_SeparationAssembly);
END_ENTITY;
```

```
ENTITY FireEscapeRoute
 SUBTYPE OF (GeneralSpaceAssembly);
END_ENTITY;

ENTITY FireInsulationFactor
 SUBTYPE OF (InsulationFactor);
END_ENTITY;

ENTITY FittingObject
 SUPERTYPE OF (ONEOF( StreetFurnitureObject))
 SUBTYPE OF (BC_FurnishingElement);
END_ENTITY;

ENTITY Floor
 SUBTYPE OF (BC_SeparationElement);
END_ENTITY;

ENTITY FormWorkObject
 SUBTYPE OF (ResultingResourceObject);
END_ENTITY;

ENTITY Foundation
 SUBTYPE OF (BC_StructuralAssembly);
END_ENTITY;

ENTITY Frame
 SUBTYPE OF (BC_StructuralAssembly);
END_ENTITY;

ENTITY FurnitureObject
 SUBTYPE OF (BC_FurnishingElement);
END_ENTITY;

ENTITY GeneralElementarySpace
 SUPERTYPE OF (ONEOF( SanitarySpace, TechnicalSpace, CirculationSpace, ParkingPlace))
 SUBTYPE OF (GeneralSpaceObject);
END_ENTITY;

ENTITY GeneralSpaceAssembly
 SUPERTYPE OF (ONEOF( FireEscapeRoute, SanitarySpaceBlock, ParkingSpace))
 SUBTYPE OF (GeneralSpaceObject);
 consists_of                 : OPTIONAL SET [1:?] OF GeneralElementarySpace;
END_ENTITY;

ENTITY GeneralSpaceObject
 SUPERTYPE OF (ONEOF( GeneralSpaceAssembly, GeneralElementarySpace))
 SUBTYPE OF (BC_SpaceObject);
END_ENTITY;

ENTITY GIS_Position;
 longitude                  : Longitude;
 elevation                  : OPTIONAL Elevation;
 latitude                   : Latidude;
END_ENTITY;

ENTITY GypsumPlate
 SUBTYPE OF (BC_SeparationPart);
```

END_ENTITY;

ENTITY Hall
 SUBTYPE OF (CirculationSpace);
END_ENTITY;

ENTITY HeatExchanger
 SUBTYPE OF (BC_HVAC_Part);
END_ENTITY;

ENTITY Hole
 SUBTYPE OF (BC_SeparationFeature);
END_ENTITY;

ENTITY HospitalSpaceObject
 SUBTYPE OF (SpecificSpaceObject);
END_ENTITY;

ENTITY HumanResource
 SUBTYPE OF (AcquiredResourceObject);
END_ENTITY;

ENTITY InnerWall
 SUBTYPE OF (BC_SeparationElement);
END_ENTITY;

ENTITY InsulationFactor
 SUPERTYPE OF (ONEOF(ThermalInsulationFactor, AccousticInsulationFactor, FireInsulationFactor));
END_ENTITY;

ENTITY InsulationPipe
 SUBTYPE OF (BC_ElectricityDistributionPart);
END_ENTITY;

ENTITY ItemCost
 SUBTYPE OF (BC_Cost);
END_ENTITY;

ENTITY LPG_Tank
 SUBTYPE OF (BC_GasDistributionPart);
END_ENTITY;

ENTITY Level;
 located_by   : OPTIONAL PlaceOrientation;
 belongs_to_level   : OPTIONAL Level;
END_ENTITY;

ENTITY LiftShaft
 SUBTYPE OF (CirculationSpace);
END_ENTITY;

ENTITY LightSwitch
 SUBTYPE OF (BC_ElectricityDistributionPart);
END_ENTITY;

ENTITY LoadbearingWall
 SUBTYPE OF (BC_StructuralElement);

```
END_ENTITY;

ENTITY Logical_Id;
  logical_id_value          : STRING;
  logical_id_purpose        : OPTIONAL STRING;
END_ENTITY;

ENTITY MachineObject
  SUBTYPE OF (BC_FurnishingElement);
END_ENTITY;

ENTITY MakeBuyDecision
  SUBTYPE OF (BC_ResultingControlObject);
END_ENTITY;

ENTITY Manufacturer
  SUBTYPE OF (BC_Actor);
END_ENTITY;

ENTITY MeetingRoom
  SUBTYPE OF (ElementaryOfficeSpace);
END_ENTITY;

ENTITY Notch
  SUBTYPE OF (BC_StructuralFeature);
END_ENTITY;

ENTITY OfficeBlock
  SUBTYPE OF (OfficeSpaceAssembly);
  consists_of               : OPTIONAL SET [1:?] OF BusinessUnit;
END_ENTITY;

ENTITY OfficeRoom
  SUBTYPE OF (ElementaryOfficeSpace);
END_ENTITY;

ENTITY OfficeSpaceAssembly
  SUPERTYPE OF (ONEOF( OfficeBlock, BusinessUnit))
  SUBTYPE OF (OfficeSpaceObject);
  consist_of                : OPTIONAL SET [1:?] OF ElementaryOfficeSpace;
END_ENTITY;

ENTITY OfficeSpaceObject
  SUPERTYPE OF (ONEOF( ElementaryOfficeSpace, OfficeSpaceAssembly))
  SUBTYPE OF (SpecificSpaceObject);
END_ENTITY;

ENTITY Organisation
  SUBTYPE OF (BC_Actor);
END_ENTITY;

ENTITY Parallel
  SUBTYPE OF (BC_SequenceRelation);
END_ENTITY;

ENTITY ParametricShape
  SUBTYPE OF (BC_Shape);
```

END_ENTITY;

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Version::T100

```
ENTITY ParkingPlace
 SUBTYPE OF (GeneralElementarySpace);
END_ENTITY;

ENTITY ParkingSpace
 SUBTYPE OF (GeneralSpaceAssembly);
 consists_of                  : OPTIONAL SET [1:?] OF ParkingPlace;
END_ENTITY;

ENTITY Penthouse
 SUBTYPE OF (BuildingElementAssembly);
END_ENTITY;

ENTITY Person
 SUBTYPE OF (BC_Actor);
END_ENTITY;

ENTITY Photograph
 SUBTYPE OF (BC_ShapePresentation);
END_ENTITY;

ENTITY Pile
 SUBTYPE OF (BC_StructuralElement);
END_ENTITY;

ENTITY PipeBend
 SUBTYPE OF (BC_PipingFeature);
 degree                       : REAL;
END_ENTITY;

ENTITY PlaceOrientation;
 oriented_by       : OPTIONAL SET [1:?] OF Orientation;
 located_at                   : Point_3D;
END_ENTITY;

ENTITY PlantingObject
 SUBTYPE OF (BC_FurnishingElement);
END_ENTITY;

ENTITY PlugSocket
 SUBTYPE OF (BC_ElectricityDistributionPart);
END_ENTITY;

ENTITY Point_3D;
END_ENTITY;

ENTITY Precedes
 SUBTYPE OF (BC_SequenceRelation);
END_ENTITY;

ENTITY Principal
 SUBTYPE OF (BC_Actor);
END_ENTITY;

ENTITY ProduceDrawing
 SUBTYPE OF (BC_DesignTask);
 results_in                   : SET [1:?] OF TechnicalDrawing;
```

END_ENTITY;

ENTITY QualityClause;
 quality_clause_description : OPTIONAL STRING;
 quality_clause_number   : STRING;
END_ENTITY;

ENTITY RC_bar
 SUBTYPE OF (BC_StructuralPart);
END_ENTITY;

ENTITY RC_Concrete
 SUBTYPE OF (BC_Material);
END_ENTITY;

ENTITY Radiator
 SUBTYPE OF (BC_HVAC_Part);
END_ENTITY;

ENTITY ReferenceComplex
 SUBTYPE OF (ReferenceShape);
 consists_of   : SET [1:?] OF ReferenceShape;
END_ENTITY;

ENTITY ReferenceFace
 SUBTYPE OF (ReferenceShape);
 defined_by   : OPTIONAL SET [1:?] OF ReferenceLine;
 face_in_volume   : OPTIONAL ReferenceVolume;
END_ENTITY;

ENTITY ReferenceLine
 SUBTYPE OF (ReferenceShape);
 defined_by   : OPTIONAL SET [1:?] OF ReferencePoint;
 line_on_face   : OPTIONAL ReferenceFace;
 line_in_volume   : OPTIONAL ReferenceVolume;
END_ENTITY;

ENTITY ReferencePoint
 SUBTYPE OF (ReferenceShape);
 point_on_line   : OPTIONAL ReferenceLine;
 point_on_face   : OPTIONAL ReferenceFace;
 point_in_volume   : OPTIONAL ReferenceVolume;
END_ENTITY;

ENTITY ReferenceShape
 SUPERTYPE OF (ONEOF(
  ReferencePoint, ReferenceLine, ReferenceFace, ReferenceVolume, ReferenceComplex))
 SUBTYPE OF (BC_Shape);
 represented_by   : OPTIONAL ExplicitShape;
END_ENTITY;

ENTITY ReferenceVolume
 SUBTYPE OF (ReferenceShape);
 defined_by   : OPTIONAL SET [1:?] OF ReferenceFace;
END_ENTITY;

ENTITY Regulation

```
  SUBTYPE OF (BC_AcquiredControlObject);
END_ENTITY;

ENTITY ResultingResourceObject
 SUPERTYPE OF (ONEOF( SupportConstructionObject, FormWorkObject))
 SUBTYPE OF (BC_ResourceObject);
END_ENTITY;

ENTITY Roof
 SUBTYPE OF (BC_SeparationAssembly);
 consists_of                  : OPTIONAL SET [1:?] OF RoofSection;
END_ENTITY;

ENTITY RoofSection
 SUBTYPE OF (BC_SeparationAssembly);
END_ENTITY;

ENTITY SanitarySpace
 SUBTYPE OF (GeneralElementarySpace);
END_ENTITY;

ENTITY SanitarySpaceBlock
 SUBTYPE OF (GeneralSpaceAssembly);
 consists_of                  : OPTIONAL SET [1:?] OF SanitarySpace;
END_ENTITY;

ENTITY Section
 SUBTYPE OF (BuildingElementAssembly);
END_ENTITY;

ENTITY SeparationConnection;
 connects                     : OPTIONAL SET [2:?] OF BC_SeparationObject;
 separation_connection_type: OPTIONAL STRING;
END_ENTITY;

ENTITY Site
 SUBTYPE OF (BC_SiteObject);
 consists_of                  : OPTIONAL SET [1:?] OF SiteElementAssembly;
 consists_of                  : OPTIONAL SET [1:?] OF SiteElement;
END_ENTITY;

ENTITY SiteComplex
 SUBTYPE OF (BC_SiteObject);
 consists_of                  : OPTIONAL SET [1:?] OF Site;
END_ENTITY;

ENTITY SiteElement;
END_ENTITY;

ENTITY SiteElementAssembly
 SUPERTYPE OF (ONEOF( ConstructionPit))
 SUBTYPE OF (BC_SiteObject);
 consists_of                  : OPTIONAL SET [1:?] OF SiteElement;
 consists_of                  : OPTIONAL SET [1:?] OF SiteElementAssembly;
END_ENTITY;

ENTITY Sketch
```

```
 SUBTYPE OF (BC_ShapePresentation);
END_ENTITY;

ENTITY Slab
 SUBTYPE OF (BC_StructuralElement);
END_ENTITY;

ENTITY Soil
 SUBTYPE OF (BC_Material);
END_ENTITY;

ENTITY SpaceConnection;
 connects                : OPTIONAL SET [2:?] OF BC_SpaceObject;
 space_connection_type   : OPTIONAL STRING;
END_ENTITY;

ENTITY SpaceOccupancy;
 profile                 : OPTIONAL OccupancyProfile;
 number_of_people        : INTEGER;
END_ENTITY;

ENTITY SpecificSpaceObject
 SUPERTYPE OF (ONEOF( DwellingSpaceObject, OfficeSpaceObject, HospitalSpaceObject))
 SUBTYPE OF (BC_SpaceObject);
 contains                : OPTIONAL SET [1:?] OF GeneralSpaceObject;
END_ENTITY;

ENTITY Staircase
 SUBTYPE OF (CirculationSpace);
END_ENTITY;

ENTITY Standard
 SUBTYPE OF (BC_AcquiredControlObject);
END_ENTITY;

ENTITY Steel
 SUBTYPE OF (BC_Material);
END_ENTITY;

ENTITY SteelProfile
 SUBTYPE OF (BC_StructuralPart);
END_ENTITY;

ENTITY Storey
 SUBTYPE OF (BuildingElementAssembly);
END_ENTITY;

ENTITY StreetFurnitureObject
 SUBTYPE OF (FittingObject);
END_ENTITY;

ENTITY StructuralConnection;
 connects                : OPTIONAL SET [2:?] OF BC_StructuralObject;
 structural_connection_type: OPTIONAL STRING;
END_ENTITY;

ENTITY SubStructure
```

```
  SUBTYPE OF (BC_StructuralAssembly);
END_ENTITY;
```

```
ENTITY Succeeds
  SUBTYPE OF (BC_SequenceRelation);
END_ENTITY;

ENTITY SuperStructure
  SUBTYPE OF (BC_StructuralAssembly);
END_ENTITY;

ENTITY Supplier
  SUBTYPE OF (BC_Actor);
END_ENTITY;

ENTITY SupportConstructionObject
  SUBTYPE OF (ResultingResourceObject);
END_ENTITY;

ENTITY TechnicalDrawing
  SUBTYPE OF (BC_ShapePresentation);
END_ENTITY;

ENTITY TechnicalSpace
  SUBTYPE OF (GeneralElementarySpace);
END_ENTITY;

ENTITY ThermalInsulationFactor
  SUBTYPE OF (InsulationFactor);
END_ENTITY;

ENTITY Transformer
  SUBTYPE OF (BC_ElectricityDistributionPart);
END_ENTITY;

ENTITY Truss
  SUBTYPE OF (BC_StructuralAssembly);
END_ENTITY;

ENTITY UnitCost
  SUBTYPE OF (BC_Cost);
  factors                    : OPTIONAL SET [1:?] OF UnitCostFactor;
END_ENTITY;

ENTITY WallPanel
  SUBTYPE OF (BC_SeparationPart);
END_ENTITY;

ENTITY Window
  SUBTYPE OF (ClosingObject);
END_ENTITY;

ENTITY Wing
  SUBTYPE OF (BuildingElementAssembly);
END_ENTITY;

ENTITY Wood
  SUBTYPE OF (BC_Material);
END_ENTITY;
```

END_SCHEMA;

5   Application Interpreted Model

6   Conformance Requirements

Annex A

(normative)

AIM EXPRESS expanded listing

Annex B

AIM short names of entities

Annex C

(normative)

Implementation method specific requirements

Annex D

(normative)

Protocol Information Conformance Statement (PICS) proforma

Annex E

(normative)

Information object registration

Annex F

(informative)

Application activity model

Annex G

(informative)

Application Reference Model

This annex provides the Application Reference Model for the exchange of building construction core information. This ARM presents a graphical representation of the structure and constraints of the application objects specified in clause 4 of this part of ISO 10303. The ARM is independant of any implementation method.

NOTE - The application reference model is represented using the EXPRESS-G modelling language